North Carolina Department of Transportation
Statewide Planning Branch
Systems Planning Unit

THOROUGHFARE PLAN TECHNICAL REPORT

for

PASQUOTANK COUNTY

February, 1998

Thoroughfare Plan
for
Pasquotank County, North Carolina

Prepared by:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In cooperation with:

Pasquotank County
The Federal Highway Administration
The United States Department of Transportation

December, 1997

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Overview

In 1997, the Elizabeth City Thoroughfare Plan was completed. As part of a larger effort to plan for the county's future, the Pasquotank and Camden County thoroughfare plans were developed. This report documents the Pasquotank County Thoroughfare Plan. Most of Pasquotank County is primarily agricultural and is anticipated to stay this way for the foreseeable future. The central part of the county, within the Elizabeth City Planning Area Boundary (PAB), is developing at a faster pace and is attracting increased residential and industrial development. The Elizabeth City Thoroughfare Plan encompasses most of the development in the county. The Pasquotank County Thoroughfare Plan includes only the area outside of the Elizabeth City PAB.

Thoroughfare Planning

Thoroughfare planning helps to ensure that the transportation system in the County is efficient enough to provide quick and convenient transportation for the people and goods of the region over the next 25 years. In a thoroughfare plan, future traffic problems are anticipated and recommendations are developed for improving the road system. This plan consists of a system of major roads and highways that will satisfy the anticipated transportation needs of Pasquotank County into the 21st century.

Two major benefits are derived from thoroughfare planning. First, each road can be designed with a specific function and a specific level of service in mind. This will save money in right-of-way, construction, and maintenance costs. Through traffic will be minimized in neighborhoods by designating certain roads to be used primarily for through-travel. Also, local officials will be informed of future road improvements which can be incorporated into other planning and policy decisions. This will minimize negative impacts to the community by allowing developers to design subdivisions that incorporate proposed roads, and allowing school and park officials to better locate their facilities..

Status of the Pasquotank County Thoroughfare Plan

The Pasquotank County Board of Commissioners has decided not to move forward with the adoption of the Pasquotank County Thoroughfare Plan. Much of Pasquotank County is included in the adopted Elizabeth City urban thoroughfare planning area. However, Pasquotank County did not feel that they were adequately involved in the development of the Elizabeth City Plan, and were not asked to adopt the final plan.

A meeting was held on September 16, 1997 to discuss this issue. In attendance were the Pasquotank County Planner and Manager, the Elizabeth City Planner, and representatives from the NCDOT. At this meeting, NCDOT offered to revise the Elizabeth City Thoroughfare Plan to address the concerns of Pasquotank County, with the coordination of the Elizabeth City Officials. Pasquotank County and Elizabeth City have decided not to pursue this option.

When the Elizabeth City Thoroughfare Plan is updated, it is recommended that the Elizabeth City and Pasquotank County Thoroughfare Plans be combined.

Summary of Recommendations

The following is a summary of major recommended improvements to the roads in Pasquotank County over the next 25 years. These improvements are based on many factors, including population projections, land use patterns, traffic data, roadway conditions, bridge conditions, environmental concerns, and public input. Recommendations for the urban area of Elizabeth City are not included in this report because it has a separate thoroughfare plan. However, the Elizabeth City Thoroughfare Plan is located in Appendix G.

- **R-2579** is a current TIP project. It is the widening of US 158 from NC 32 in Sunbury to US 17 east of Morgans Corner, to a multi-lane facility. This project is currently classified as an identified future need.

Implementation

The development of the thoroughfare plan is the first step in getting new road and highway projects implemented. This plan should be used by Pasquotank County as technical support when requesting projects from the North Carolina Board of Transportation, from the NCDOT Division Engineer, or at the Transportation Improvement Program (TIP) hearings held each fall. The plan should also be used when the County develops other plans, such as land use, parks and recreation, or area comprehensive plans, or when making policy decisions, such as subdivision approvals, to ensure that these will be compatible with the proposed roadway system.

The Statewide Planning Branch of NCDOT can help with these tasks by answering questions, reviewing subdivision plats, and preparing functional designs of proposed roads.

Chapter 1
Introduction

The North Carolina Department of Transportation (NCDOT), along with Pasquotank County Officials, conducted a thoroughfare plan study in an effort to plan for the future transportation needs of Pasquotank County.

The objective of thoroughfare planning is to enable the transportation network to be progressively developed to adequately meet the transportation needs of a community or region as land develops and traffic volumes increase. Planning now for our future transportation needs reduces unnecessary costs and disruption to citizens, businesses, and the environment. Thoroughfare planning is a tool that can be used by local officials to plan for future transportation needs, while at the same time minimizing negative impacts to the county.

The proposed Pasquotank County Thoroughfare Plan was developed following the principles of county thoroughfare planning outlined in Appendix B of this report. Thoroughfares were identified based upon existing and anticipated land use and population distribution, topographic conditions, and field investigations. The plan includes all improvements that are essential for an efficient transportation system within the 1996-2025 planning period. The plan does not attempt to modify the thoroughfare plan already developed for the Elizabeth City urban area.

The North Carolina Department of Transportation will be primarily responsible for improvements within the County. However, Pasquotank County can greatly contribute to the implementation of this plan by enforcing subdivision and zoning regulations. Mutual Adoption by both Pasquotank County and the Department of Transportation will allow the development of an effective thoroughfare system.

Chapter 2
Recommended Thoroughfare Plan

A thoroughfare planning study identifies existing and future deficiencies in the transportation system and proposes solutions to solve these problems. The thoroughfare plan recommendations outline the transportation system needed to satisfy anticipated traffic demands in Pasquotank County over the next 30 years. Each road in the thoroughfare plan was evaluated based on the following factors: alignment, capacity, width, number of lanes, traffic volume, land use patterns, and pavement structure. Recommendations for road improvements are based on these evaluated factors. Additionally, concerns such as environmental issues, economic growth, and local input were also considered in the development of the plan. Figure 1 shows the proposed thoroughfare plan for Pasquotank County.

The thoroughfare plan recommendations for Pasquotank County are listed below and shown in Figure 2. They are listed according to the functional classification of each road (see ***Appendix B*** for a description of functional classification). The functional classification map for Pasquotank County is shown in Appendix B.

Thoroughfare Plan Recommendations

Transportation Improvement Project (TIP) Improvements:

- One project in the Pasquotank County planning area currently in the Transportation Improvement Program (TIP) is R-2579. It is the widening of US 158 from NC 32 in Sunbury to US 17 east of Morgans Corner to a multi-lane facility. This project is currently programmed in the 1998-2004 TIP.

Other Recommendations

There is one other recommendation that is not a TIP Project. As requested by the Pasquotank County Planning Board, it is recommended that a connecting road be constructed to connect SR 1144 (Simpson Ditch Road) to SR 1101 (Peartree Road). SR 1144 dead ends at SR 1139 (Body Road), prohibiting through traffic. Therefore traffic has to travel south for 1.3 miles, turn left and then travel north for 1.5 miles to arrive at a point directly east of where SR 1144 dead ends. A connecting road, approximately 1 mile long, would alleviate this inconvenience. This recommendation is located in the Elizabeth City Thoroughfare Plan planning area; therefore, it will not be part of the Pasquotank County Thoroughfare Plan. Instead, it will have to be added to the Elizabeth City Thoroughfare Plan through coordination with Elizabeth City officials. Table 1 prioritizes the recommended improvements.

Table 1

Recommended Improvement Priorities and Cost Estimates		
Priority	**Description**	**Cost**
*1	R-2579, US 158 from NC 32 in Sunbury to US 17 east of Morgans Corner, widen to a multi-lane facility.	$39,000,000

* Included in 1999-2004 Transportation Improvement Program

The North Carolina Highway Trust Fund Law

The Highway Trust Fund Law was established in 1989 as a 13-1/2 year plan with four major goals for North Carolina's roadway network. These goals are:

1. To complete four-lane construction on the 3,600 mile (5,800 km) North Carolina Intrastate System.
2. To construct a multi-lane connector in Asheville and portions of multi-lane loops in Charlotte, Durham, Greensboro, Raleigh, Wilmington, and Winston-Salem.
3. To supplement the secondary roads appropriation in order to pave, by 1999, 10,000 miles (16,000 km) of unpaved secondary roads carrying 50 or more vehicles per day, and all other unpaved secondary roads by 2006.
4. To supplement the Powell Bill Program.

The portion of this law that will most benefit Pasquotank County is the paving of the unpaved roads on the State maintained system by the end of the planning period. For more information on the Highway Trust Fund Law, contact the Program Development Branch of the North Carolina Department of Transportation.

Construction Priorities and Cost Estimates

Construction priorities vary depending on the criteria considered and the weight attached to these criteria. Most people would agree that improvements to the major thoroughfare system and major traffic routes are more important than improvements to minor thoroughfares where traffic volumes are lower. To be included in the North Carolina Transportation Improvement Program, a project must show favorable benefits relative to cost and should not be prohibitively disruptive to the environment. Thus, to help the State and the County in their efforts to implement the thoroughfare plan, major projects are placed in order of priority based on benefit/cost comparisons. Since there are no projects recommended, no benefit/cost analysis was done.

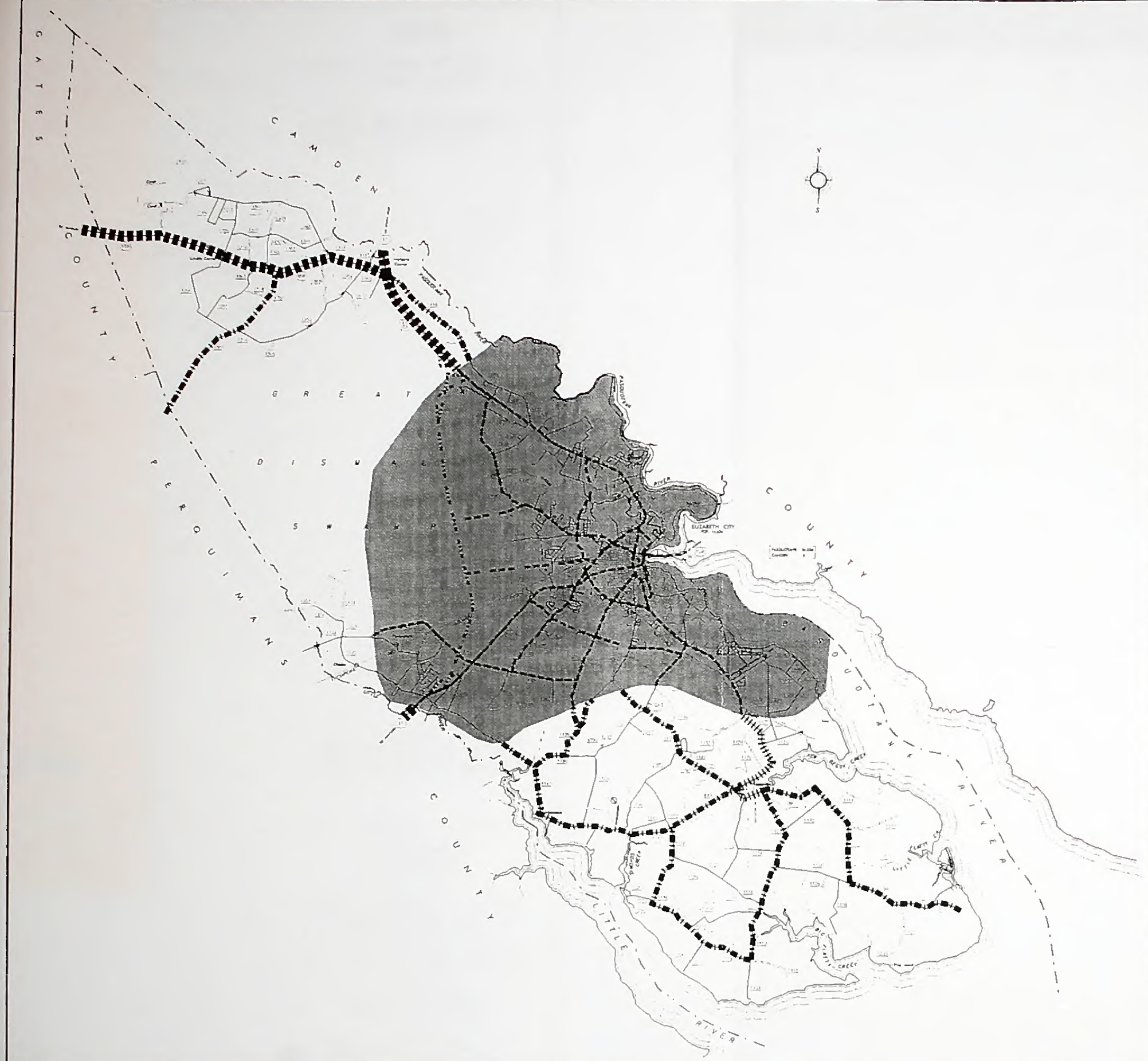
Bridge Replacement Priorities

The deficient bridges shown in Table 2 were placed in priority order based on computer data and information supplied by the Bridge Maintenance Unit of the North Carolina Department of Transportation. Data such as the remaining life of the bridge, length, width, sufficiency rating, and traffic volume were used to determine bridge replacement priorities. Additional information on rating deficient bridges is located in Chapter 5 of this report. The location of these bridges is shown in Figure 3.

Table 2

Recommended Bridge Improvement Priorities						
Brg. No.	**SD/ FO**	**Facility Carried**	**Feature Intersected**	**Suff. Rating**	**1993 ADT**	**Replacement Cost Estimate**
24	SD	SR 1140	Halls Creek	17.3	900	$156,400
55	FO	SR 1354	Swamp	37.1	1200	$45,900
30	FO	SR 1303	Little River	40.0	360	$99,400
5	SD	SR 1103	Fatty Creek	46.6	250	$105,000

SD = Structurally Deficient
FO = Functionally Obsolete



LEGEND

	EXISTING	PROPOSED
INTERSTATE		
OTHER PRINCIPAL ARTERIALS		
MINOR ARTERIALS		
MAJOR COLLECTORS		
MINOR COLLECTORS		
PROPOSED URBAN FREEWAY		
URBAN MAJOR THOROUGHFARE		

URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

ADOPTED BY:

PASQUOTANK COUNTY PUBLIC HEARINGS _____

_____

_____

_____

RECOMMENDED BY STATEWIDE PLANNING _____

N.C. DEPARTMENT OF TRANSPORTATION _____

April 23, 1997

FIGURE 1

PROPOSED THOROUGHFARE PLAN

PASQUOTANK COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT

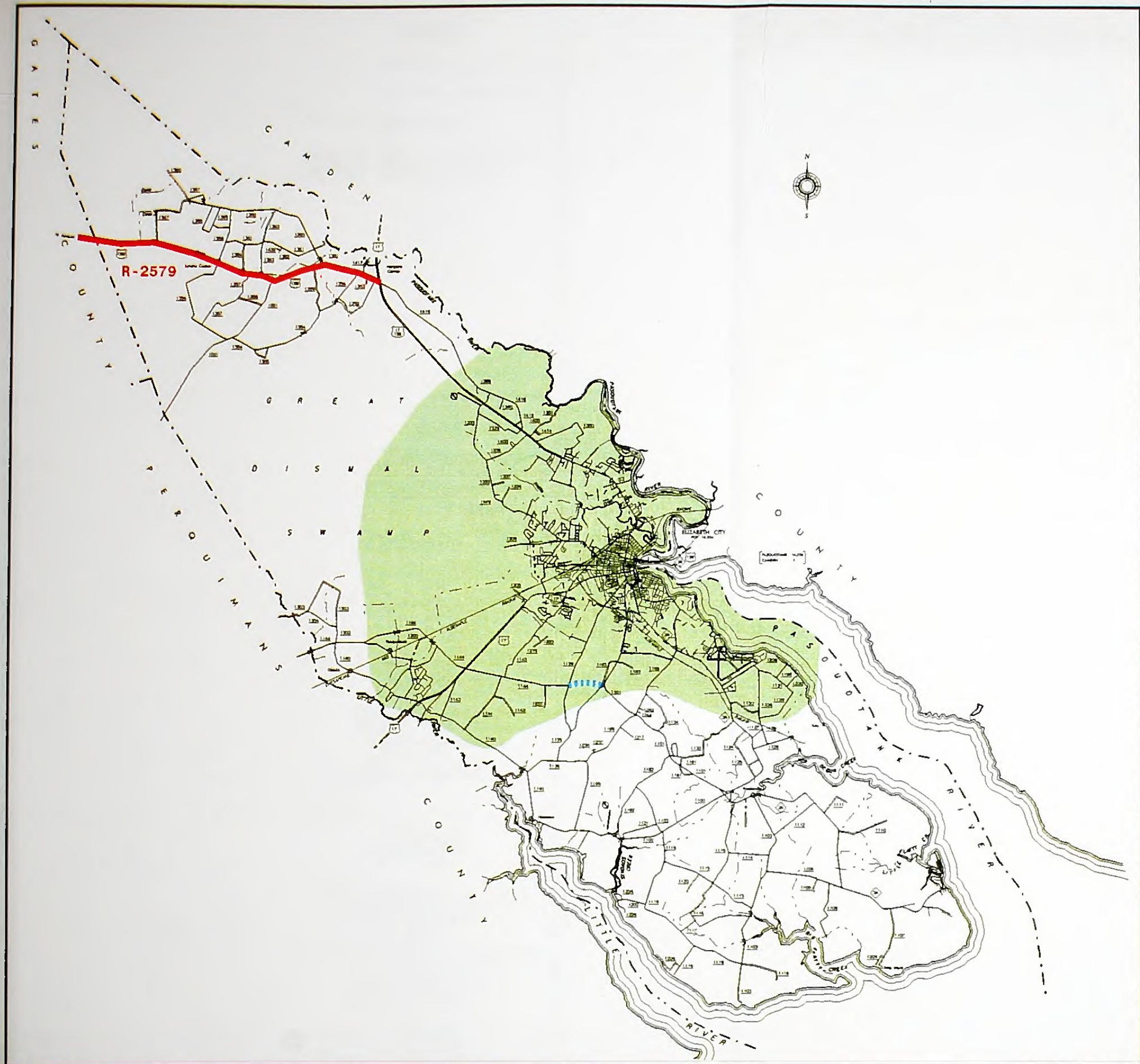
IN COOPERATION WITH THE

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 2 4 6 8
Kilometers

1 0 1 3 5
miles



LEGEND

TIP PROJECT (WIDENING)

CONNECTOR ROAD (NEW LOCATION)

URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

FIGURE 2

RECOMMENDED IMPROVEMENTS

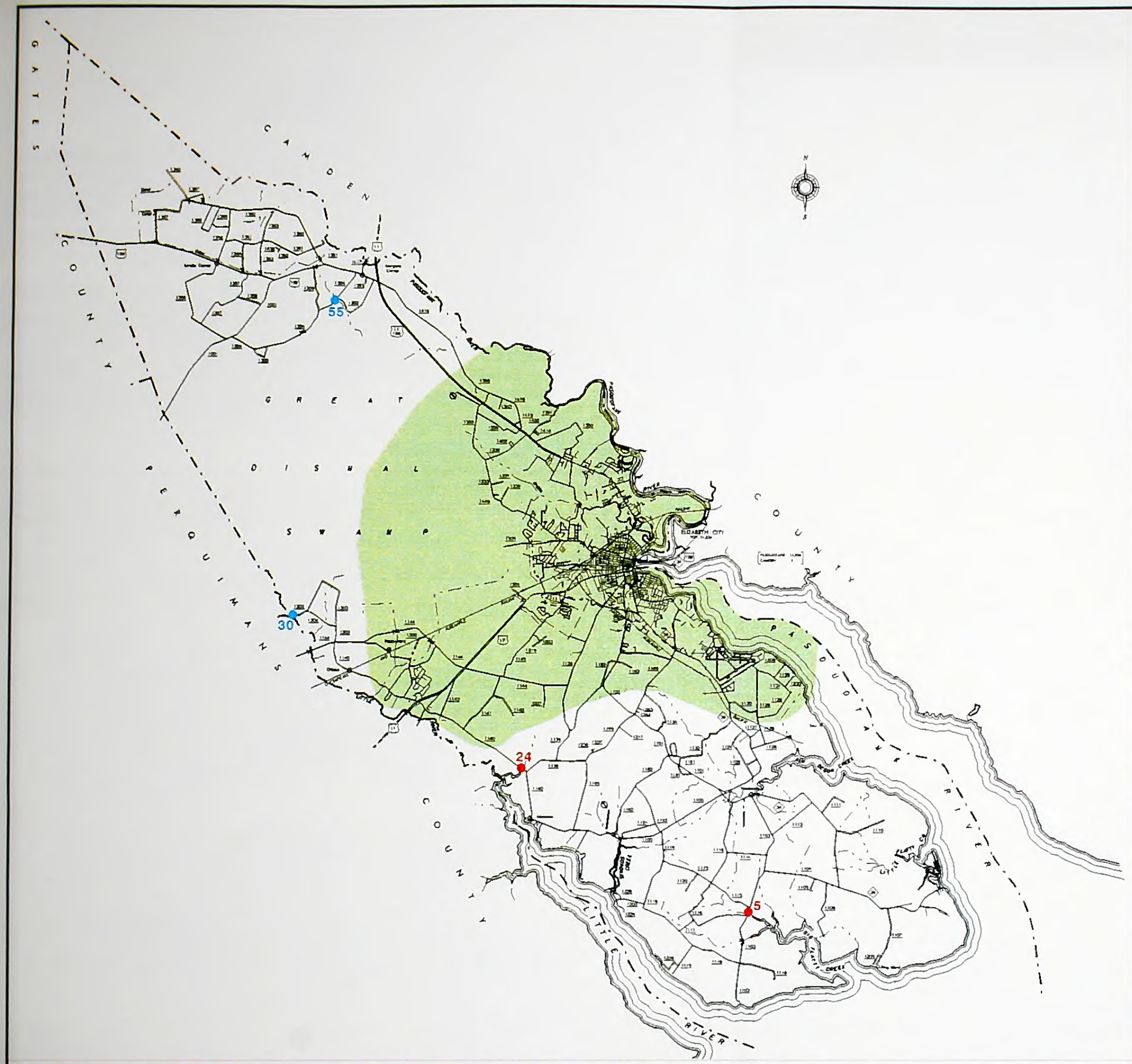
PASQUOTANK COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



LEGEND

- FUNCTIONALLY OBSOLETE BRIDGE
- STRUCTURALLY DEFICIENT BRIDGE
- 00 or 00 BRIDGE NUMBER
- URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

FIGURE 3

DEFICIENT BRIDGE LOCATIONS

PASQUOTANK COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – GIS UNIT

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 2 4 6 8
Kilometers

1 0 1 2 3 5
miles

Chapter 3
Implementation

Implementation is one of the most important aspects of the thoroughfare plan. Implementation must be an integral part of this process, or the effort and expense associated with developing the plan is useless. This is the responsibility of the county. There are several tools available to assist in the implementation of the thoroughfare plan. They are as follows:

State-County Adoption of Thoroughfare Plan

The first step in the implementation process is the mutual adoption of the thoroughfare plan by Pasquotank County and the North Carolina Department of Transportation. The mutually approved plan may then serve as a guide for the Department of Transportation in the development of the road and highway system for the County. The adoption of the plan by the County also enables standard road regulations and land use controls to be used effectively in the implementation of this plan.

Corridor Preservation

The next step in implementing the thoroughfare plan is corridor preservation. Corridor preservation is a critical step in the implementation process because it minimizes the disruption of future road construction on the local residents and businesses, as well as on the environment. Through measures such as subdivision, land use, and development regulations, the County can protect the necessary rights-of-way for the recommended improvements.

Subdivision Controls

Subdivision regulations require every contractor to submit to the County Planning Commission a plan of any proposed subdivision. It also requires that subdivisions be constructed to certain standards. Through this process, it is possible to require the subdivision streets to conform to the thoroughfare plan and to reserve or protect necessary rights-of-way for projected roads and highways that are to become a part of the thoroughfare plan. The construction of subdivision streets to adequate standards reduces maintenance costs and simplifies the transfer of streets to the State Highway System.

This tool would be applicable to the construction of any new facilities. Ensuring that contractors include planned transportation facilities in their designs can help reduce highway construction costs and possible disruption to future homes and businesses.

Land Use Controls

Land use regulations are an important tool in that they regulate future land development and minimize undesirable development along roads and highways.

The land use regulatory system can improve highway safety by requiring sufficient setbacks to provide for adequate sight distances and by requiring off-street parking.

This tool would be applicable to facilities that are recommended to be widened to multiple lanes such as TIP Project R-2579. Land use controls can help to ensure that these facilities will maintain their intended capacities by regulating the types of land use that develop along the roads.

Development Regulations

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation. In addition, any development expected to generate large volumes of traffic (e.g., shopping centers, fast food restaurants, or large industries) may be comprehensively studied by staff from the Traffic Engineering Branch, Statewide Planning Branch, and/or Roadway Design Unit of NCDOT. If done at an early stage, it is often possible to significantly improve the development's accessibility while preserving the integrity of the thoroughfare plan. Since the County is the first point of contact for developers, it is important that the County advise developers of this review requirement and cooperate in the review process.

Use of development regulations can help control increasing traffic and congestion along roads experiencing heavy development pressures.

Funding

The final step in the implementation process is to obtain funding for each project. Sources such as the Transportation Improvement Program, small urban funds, enhancement funds, and industrial access funds are a few examples of funding sources available to the County.

Transportation Improvement Program

North Carolina's Transportation Improvement Program (TIP) is a document which lists major construction projects the Department plans for the next seven years. TIP projects are matched with project funding sources. Each year when the TIP is updated, completed projects are removed, programmed projects are advanced, and new projects are added.

Annual TIP public hearings are held each October and November. At these public hearings, municipalities request projects to be included in the TIP. A Board of Transportation Member reviews all of the project requests in a his or her division. Based on technical feasibility, need, and available funding, the Board Member decides which projects will be included in the TIP. In addition to highway construction and widening, TIP funds are also available for other projects including bridge replacement, highway safety, public transit, railroad crossings, and bicycle facilities.

Small Urban Funds
Small Urban Funds are discretionary funds available to each of the 14 divisions on an annual basis. Each division receives $1 million per year. The Board Member uses this money to fund projects at his or her discretion. These funds are available for the construction of projects occurring within the city limits or at least within one mile of the municipal boundaries. Request for Small Urban Fund assistance should be directed to the appropriate Board Member and Division Engineer.

Enhancement Funds
The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 provides federal funds for transportation enhancement activities. These activities must have a direct relationship to the intermodal transportation system. This relationship may be one of function, proximity, or impact. Activities that may be eligible for these funds include: pedestrian and bicycle facilities; acquisition of scenic easements and scenic or historic sites; scenic or historic highway programs; landscaping and other scenic beautification; historic preservation; rehabilitating and operating historic transportation buildings, structures, or facilities; preserving abandoned railway corridors; controlling and removing outdoor advertising; archaeological planning and research; and mitigating water pollution due to highway runoff. For additional information concerning these funds, contact the Program Development Branch of the NC Department of Transportation.

Industrial Access Funds
Industrial Access funds are used by the Department to finance both new highway construction and improvements to existing roads or bridges as incentive to develop industrial interests. For example, if an industry wishes to develop property that does not have access to a state maintained highway and certain economic conditions are met, then funds may be available for construction of an access road. For additional information concerning these funds, contact the Program Development Branch of the NC Department of Transportation.

Chapter 4
Trends and Related Issues

The objective of thoroughfare planning is to develop a transportation system that will meet future travel demand and enable people and goods to travel safely and economically. To determine the needs of an area, it is important to understand the role of population, the economy, land use, and vehicle registration and use.

Population

The amount of traffic on a section of road is a function of the size and location of the population it serves. Investigating past trends in population growth and forecasting future population growth and dispersion is one of the first steps for a transportation planner. Table 3 shows population trends and forecasts for Pasquotank County, while Table 4 shows trends for the individual townships. This information illustrates the growth that is taking place in the county and is anticipated to continue into the next century.

However, residential population figures are only part of the growth in Pasquotank County. During the summer months, the population and traffic increases to accommodate tourists traveling to and through the county.

Table 3

Pasquotank County Population Growth		
Year	Population	Growth
1970	26,824	...
1980	28,462	1,638
1990	31,298	2,836
* 2000	34,844	3,546
* 2010	37,715	2,871
* 2020	40,614	2,899
** 2025	43,850	3,236

* Projections from Office of State Planning, Demographics Unit
** Estimate

Table 4

Township Population Growth				
Township	**1970**	**1980**	**1990**	**Growth, '70-'90**
Elizabeth City	15,507	14,297	12,759	-2748
Mount Hermon	2,352	3,403	4,340	2,288
Newland	1,923	2,059	2,046	123
Nixonton	3,135	3,591	5,839	2,704
Providence	2,819	3,910	4,903	2,084
Salem	1,088	1,202	1,411	323

Economy and Employment

An important factor to consider in estimating the future traffic growth of an area is its economic base. The economic base determines the employment type and size, as well as commuter traffic patterns around the county. This will influence the population of an area. Employment figures for Pasquotank County show that in 1990 there were 13,625 employed residents. Of these residents, 23% (3,034 residents) commuted to jobs outside Pasquotank County each day. Fourteen hundred and sixty out-commuters were employed in Virginia. There were also 3,584 people who commuted *into* Pasquotank County each day for employment, mainly from Camden County (1,180 residents) and Perquimans County (1,074 residents).

The imbalance between in-commuters and out-commuters indicates that the county serves as a "bedroom" community to nearby larger employment centers. This development pattern is expected to continue. The commuting imbalance, and the longer distances people typically travel to work, causes increased strain on the major road arteries during morning and afternoon peak rush hours. Commuting information for Pasquotank County is summarized in Table 5.

Table 5

Commuting Patterns (100+ Commuters)		
Location of Residence	**Location of Work**	**Number of Commuters**
Pasquotank County	Camden County	187
Pasquotank County	Chowan County	113
Pasquotank County	Currituck County	168
Pasquotank County	Dare County	324
Pasquotank County	Perquimans County	227
Pasquotank County	Chesapeake Bay Area	1460
Chowan County	Pasquotank County	289
Perquimans County	Pasquotank County	1074
Newport News, VA	Pasquotank County	127
Currituck County	Pasquotank County	379
Camden County	Pasquotank County	1180
Total Number of People Commuting from Pasquotank County		3,034
Total Number of People Commuting to Pasquotank County		3,584
Total Number of Employed Residents in Pasquotank County		13,075
Total Number of People Working in Pasquotank County		13,625

Data from the 1990 Census of Population and Housing.

* The Chesapeake Bay Area consists of the following areas in southeast Virginia: Norfolk, Chesapeake, Virginia Beach, Portsmouth, Suffolk, Hampton, and Newport News.

Land Use

Land use refers to the physical patterns of activities and functions within a city or county. Most traffic problems in a given area can be attributed to the type of land use. For example, a large business might cause congestion as workers change shifts. However, during the remainder of the day traffic congestion at the business is rare. The distribution of different types of land use is the main influence on congestion. Traffic between different land uses varies depending on the size, type, density, and distance between each.

Typically in transportation planning, land uses are grouped into four categories:

1. Residential - all land devoted to the housing of people (excluding hotels and motels);
2. Commercial - all land devoted to retail trade, including consumer and business services and offices;
3. Industrial - all land devoted to manufacturing, storage, warehousing, and transportation of products; and
4. Public - all land devoted to social, religious, educational, cultural, and political activities.

Locating where expected growth will occur within the county determines the location of proposed thoroughfares or the improvements of existing thoroughfares.

In coastal communities, land uses generate a significant amount of traffic when compared to other counties The increased strain that these developments contribute to the highway system is especially felt during the summer season, when tourist traffic is at its peak. Pasquotank County provides main routes to the outerbanks, which is increasing and will most likely continue to increase throughout the planning period.

Vehicle Registration

Since 1970, the number of registered vehicles in the county has increased at a greater rate than the population. This means that there are more vehicles available per person. Table 6 compares the ratio between population and the number of cars for North Carolina and Pasquotank County. The table includes past and projected ratios. This ratio is obtained by dividing the total population of the area by the total number of vehicles registered in that area. The decreasing trend shows that the automobile is used more today then in the past. More vehicle trips are being made and fewer trips are consolidated into "multi-purpose" trips. As a result of this, traffic and congestion are growing on the road system at a faster rate than the associated population.

Table 6

Persons per Vehicle Trends		
Year	Pasquotank County	North Carolina
1970	2.34	2.03
1980	1.61	1.52
1990	1.58	1.35
*2000	1.39	1.24
*2010	1.28	1.15
*2020	1.22	1.11
*2025	1.20	1.09

* Estimated

Travel Demand

Average annual daily traffic volumes (AADT) for 1995 on selected major roads in Pasquotank County are shown in Figure 4. Also shown are projections for the year 2025, assuming no changes to the existing street system are made. These projections were based on historic and anticipated population, economic growth patterns, and land use trends.

Typically, AADTs are used in the analysis of roadway capacity deficiencies for an area. However, because of its location on the coast, Pasquotank County's traffic volumes vary considerably with the seasons. The county experiences its peak traffic volumes on summer weekends when tourists are traveling to or through the area.

The goal of the Pasquotank County Thoroughfare Plan is to provide adequate travel service along the major thoroughfares during the summer weekdays. This goal serves the residents of the county by providing for their daily trips to and from work and for accomplishing daily activities during the week. Summer weekends will continue to bring congestion and traffic from out-of-town travelers because of the Pasquotank County's location. Figure 5 shows summer weekday traffic volume estimates for 1995 and 2025. These traffic volumes and projections were used in the capacity analysis of Pasquotank County's road system.

Although minimum requirements are necessary for all roads serving the public, the ultimate design of a road will vary according to the desired capacity and level-of-service to be provided. However, universal standards in the design of thoroughfares are not practical. Each road or highway section must be individually analyzed and its design requirements determined by the amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Many different factors contribute to the capacity of a roadway. These factors include:

1. Geometrics of the road, including:
    - number of lanes
    - horizontal and vertical alignment
    - proximity of perceived obstructions to safe travel along the road
2. Typical users of the road, including:
    - commuters
    - recreational travelers
    - truck traffic
3. Access control (including streets and driveways) along the road
4. Development along the road, such as:
    - residential
    - commercial
    - industrial
5. Number of traffic signals along the route
6. Peak traffic characteristics on the road:
    - rural roads tend to have a higher morning and afternoon peak period increase in traffic as compared to mid-day traffic

7. Characteristics of side-roads feeding into the road
8. Directional split of traffic, or the percentage of vehicles traveling in each direction along a road at any given time.

It is difficult to determine exactly when a road will reach its capacity because of these factors, and the changing nature of roads as development occurs. At the thoroughfare planning level, the capacity of a road is estimated using the factors above and comparing them to other roads in the state with similar past circumstances. Table 7 shows approximate capacities for various type of roadways in settings with different intensities of surrounding development. These capacities are measured in vehicles per day.

Table 7

Road Capacities (in vehicles per day)			
Development >>>	**High Intensity**	**Medium Intensity**	**Low Intensity**
2-lane road	8,000	10,000	12,000
3-lane road	12-16,000	15-18,000	20,000
4-lane road:			
undivided	18-22,000	30-35,000	45,000
divided	18-22,000	35-40,000	48,000
5-lane road	24-28,000	32-38,000	47,000
4-lane freeway		54,000	
6-lane freeway		81,000	

- Above capacities assume 3.6 m (12') lanes, 5% trucks, a 60/40 directional split of traffic, level of service D.
- *Low intensity* locations assume sparse rural development and uninterrupted flow on the roadway.
- *Medium intensity* locations assume typical suburban-type development with approximately 2 signals per mile and less than 10 other intersections per mile.
- *High intensity* locations assume dense urban development with closely spaced traffic signals and no street or driveway access control.

For driver convenience, ease of operation, and safety, it would be desirable to widen all existing roads and highways to provide a minimum lane width of 3.6 m (12 feet). However, when considering overall statewide needs and available highway revenue, this improvement applied statewide would be impractical. Therefore, it is necessary to establish minimum tolerable widths for existing roads with respect to traffic demands that would be economically feasible. The widths used in determining the existing lane deficiencies in the County are given in Table 8.

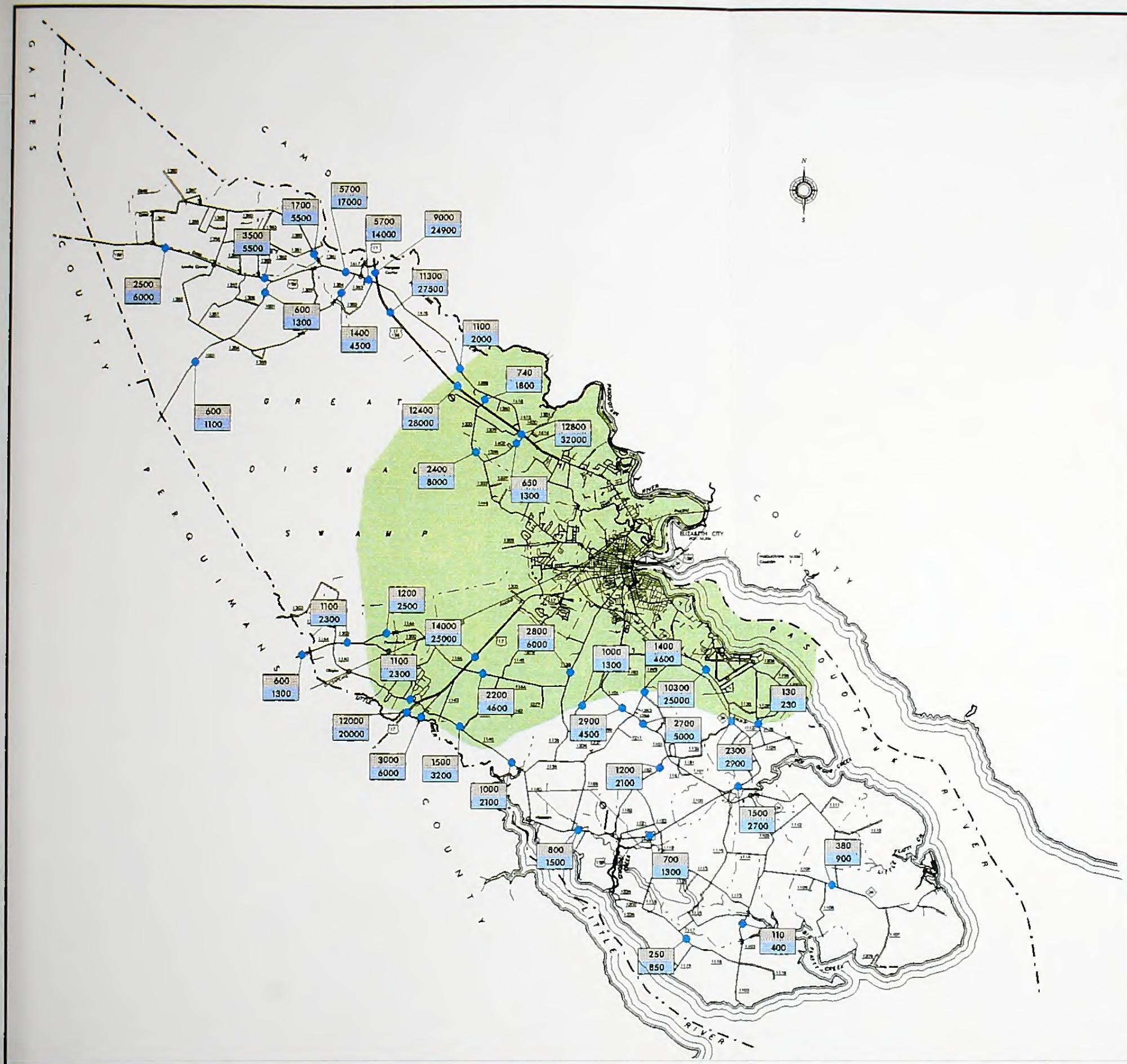
Table 8

Minimum Tolerable Lane Widths						
Average Daily Traffic	Principal Arterials (feet)	(meters)	Minor Arterials (feet)	(meters)	Collectors (feet)	(meters)
Over 2,000	11	3.3	11	3.3	11	3.3
400 - 2,000	-	-	10	3.0	10	3.0
100 - 400	-	-	10	3.0	9	2.7
Below 100	-	-	-	-	9	2.7

Transportation Improvement Program Projects

The Transportation Improvement Program (TIP) is a seven year project document that lists the major transportation improvement projects that the Department of Transportation has planned. These projects include not only roadway projects, but also bridge projects, railroad crossings, bicycle facilities, and public transportation. Pasquotank County planning area has one roadway projects identified in the 1998-2004 TIP, which is listed below:

R-2579, US 158 from NC 32 in Sunbury to US 17 east of Morgans Corner, widen to a multi-lane facility. This project is scheduled for planning to begin in year 2003.



LEGEND

1995 / 2025 — 1995 AVERAGE ANNUAL DAILY TRAFFIC / 2025 AVERAGE ANNUAL DAILY TRAFFIC

URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

FIGURE 4

AVERAGE ANNUAL DAILY TRAFFIC COUNTS

PASQUOTANK COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT

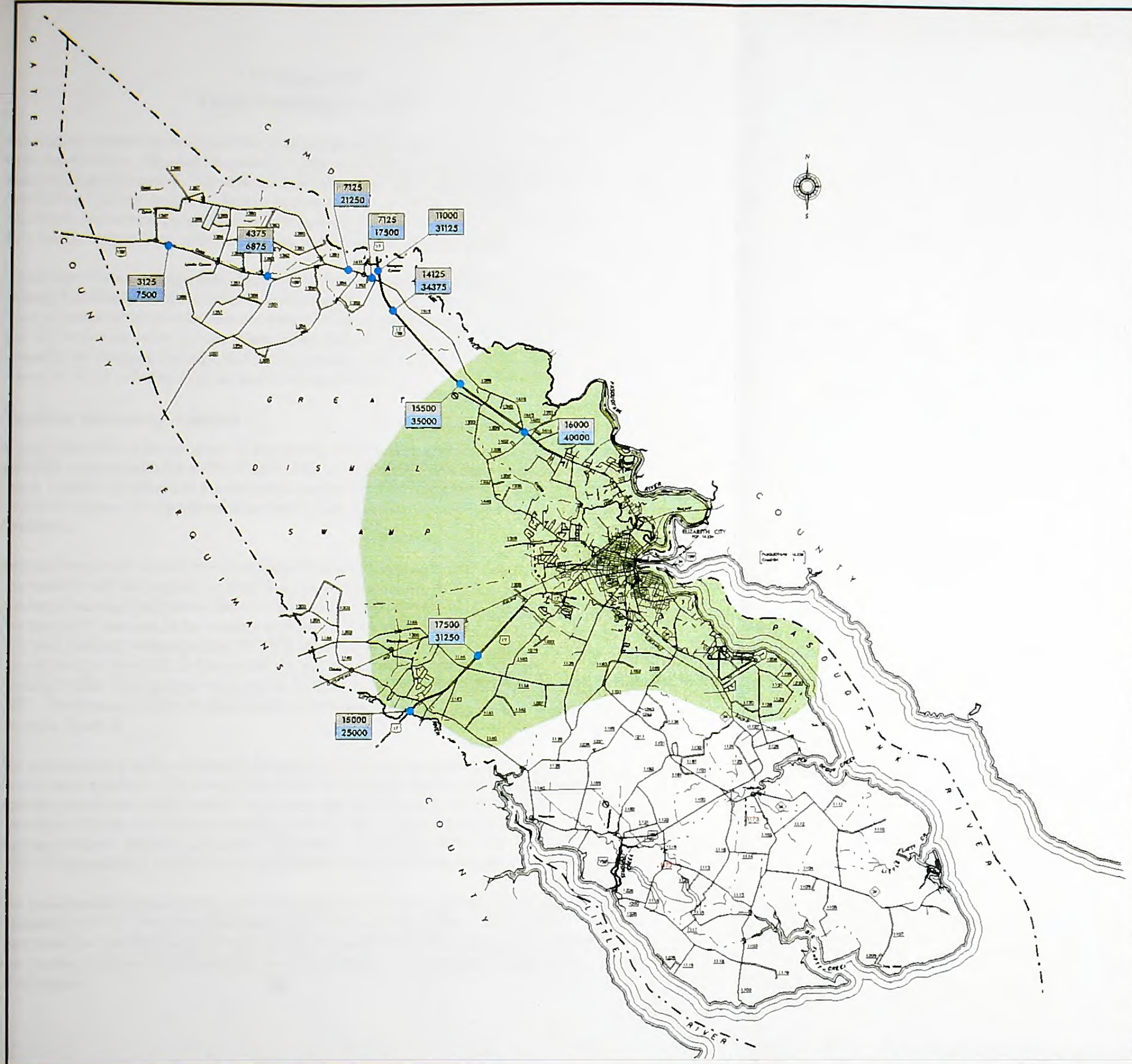
IN COOPERATION WITH THE

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 2 4 6 8
kilometers

1 0 1 2 3 5
miles



LEGEND

1995 / 2025 — 1995 AVERAGE SUMMER TRAFFIC COUNTS
2025 AVERAGE SUMMER TRAFFIC COUNTS

URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

FIGURE 5

AVERAGE SUMMER TRAFFIC COUNTS

PASQUOTANK COUNTY
NORTH CAROLINA

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SCALE

0 2 4 6 8
Kilometers

1 0 1 2 3 5
Miles

Chapter 5
Travel Deficiency Analysis

This chapter presents an analysis of the ability of the existing street system to serve the area's travel desires. Emphasis is placed not only on detecting the deficiencies, but on understanding their causes. Travel deficiencies may be localized and the result of a substandard highway design, inadequate pavement width, or intersection controls. Alternately, the underlying problem may be caused by a system deficiency, such as a need for a bypass, loop facility, additional radials, or construction of missing links.

An analysis of the roadway system must first look at existing travel patterns and identify existing deficiencies. This includes roadway capacity and safety analysis. After the existing picture of travel in the area has been developed, the engineer must analyze factors that will impact the future system. These factors include forecast population growth, economic development potential, and land use trends. This information will be used to determine future deficiencies in the transportation system.

Capacity Deficiency Analysis

A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely and at a desirable speed. Capacity is defined as the maximum number of vehicles that can pass over a given section of roadway during a given time period under prevailing roadway and traffic conditions.

Because Pasquotank County is a coastal area, traffic volumes along the major routes vary considerably with the seasons. In particular, the summer months attract a significant number of beach-going tourists, thus causing an increased strain on the highway network. Average traffic volumes in the summer are typically 25% higher than the yearly average, with peak summer weekends being 50-100% higher than the average. For this reason, the capacity analysis for roads in Pasquotank County was done using *average summer weekday* traffic. This analysis was done for both the base year, 1995, and the design year, 2025. The average summer weekday traffic counts at selected locations in the county are shown in Figure 5.

The relationship of traffic volumes to the capacity of the road determines the level of service being provided. The level of service (LOS) is a qualitative measure describing the operating conditions within a traffic stream and their perception by motorists and/or passengers. Six levels of service are used to identify the conditions existing along a highway or street. They are given letter designations, from LOS "A" to LOS "F," with LOS "A" representing the best operating conditions and LOS "F," the worst.

The recommended improvements in the thoroughfare plan were based on achieving a minimum LOS "D" on existing facilities and LOS "C" on new facilities. LOS "D" is considered the "practical capacity" of a facility, or that point at which the public begins to express dissatisfaction. These levels of service are defined and illustrated in Appendix E of this report.

1995 Analysis
The comparison of current annual average traffic volumes in Pasquotank County with the existing road capacities indicates that no roads in Pasquotank County are currently over capacity.

2025 Analysis
During the planning period from 1995 to 2025, there are no facilities that will exceed its practical capacities.

Accident Locations

Traffic accidents are often used as an indicator for locating congestion problems. Traffic accident records can be reviewed to identify problem locations or deficiencies such as poor design, inadequate signing, ineffective parking, or poor sight distance. Accident patterns developed from the analysis of accident data can lead to improvements that will reduce the number of accidents.

In the Pasquotank County Planning area there are no accident locations greater than five in a three year period. However, there is one intersection that the Planning Board wanted addressed. The Planning Board has expressed concern about the safety of the intersection of US 17-158 at Morgan's Corner. This intersection is currently being studied by Mr. Jim Leggett, Division One Traffic Engineer, per the request of Mr. Don Conner, Division One Engineer. To request a more detailed analysis for any other intersections of concern, the County should contact the Division Traffic Engineer.

Bridge Conditions

Bridges are a vital and unique element of a highway system. It is important that bridges be well constructed and inspected regularly to ensure safety of the roadway.

All bridges in North Carolina are inspected at least once every two years by NCDOT's Bridge Maintenance Unit, following federal standards. A sufficiency rating is calculated for each bridge to determine whether a bridge can remain in service. The bridges with the lowest ratings are replaced as Federal and State funds become available.

The sufficiency rating was used in this analysis to determine the deficiency of each bridge. The sufficiency rating measures several factors to determine whether a bridge is sufficient to remain in service, including: structural adequacy and safety; serviceability and functional obsolescence; essentiality for public use; type of structure; and traffic safety features. The result of this method is a percentage in which 100 percent represents an entirely sufficient bridge and zero percent represents an entirely insufficient or deficient bridge. A sufficiency rating of 50 percent or less qualifies for Federal Bridge Replacement Funds.

Deficient bridges are categorized as either structurally deficient or functionally obsolete. Structurally deficient bridges score below average in deck superstructure, substructure, overall structural condition, or waterway adequacy. Bridges in the functionally obsolete category have below average ratings in approach roadway alignment, under clearance, deck

geometry, waterway adequacy, or structural condition. Table 10 shows functionally obsolete bridges and Table 11 shows structurally deficient bridges in Pasquotank County. The location of these bridges is shown in Figure 4.

Table 9

Functionally Obsolete Bridges		
Bridge Number	**Sufficiency Rating**	**Location**
24	17.3	on SR 1140 over Halls Creek
55	37.1	on SR 1354 crossing a Swamp
30	40	on SR 1303 over Little River

Table 10

Structurally Deficient Bridges		
Bridge Number	**Sufficiency Rating**	**Location**
5	46.6	on SR 1103 over Fatty Creek

Chapter 6
Environmental Analysis

In the past several years, environmental considerations associated with highway construction have come to the forefront of the planning process. The legislation that dictates the necessary procedures regarding environmental impacts is the National Environmental Policy Act (NEPA). Section 102 of this act requires the execution of an Environmental Impact Statement (EIS) for road projects that have a significant impact on the environment. The EIS covers the impact of the project of wetlands, water quality, historic properties, wildlife, and public lands.

Environmental Screening

For all other projects on the Thoroughfare Plan, an informal environmental screening was conducted to evaluate potential impacts in several key areas of environmental concern. These areas are wetlands, threatened and endangered species, and historic sites. A discussion of each issue and the potential impacts to it are found below. An environmental map of Pasquotank County is provided in Figure 6.

Wetlands

In general terms, wetlands are lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Most wetlands have soil or substrate that is at least periodically saturated with or covered by water.

Wetlands are crucial ecosystems in our environment. They help regulate and maintain the hydrology of our rivers, lakes, and streams by slowly storing and releasing flood waters. They help maintain the quality of our water by storing nutrients, reducing sediment loads, and reducing erosion. They are also critical to fish and wildlife populations. Wetlands provide an important habitat for about one third of the plant and animal species that are federally listed as threatened or endangered.

In Pasquotank County, wetlands are a very prevalent feature, all of the thoroughfare plan proposals are located within or along existing roadway corridors. Thus, the impact to significant wetlands in the area will be minimal.

Threatened and Endangered Species

A preliminary review of the Federally Listed Threatened and Endangered Species within Pasquotank County was done to determine the effects that any proposed improvements could have on these species. These species were identified using mapping from the North Carolina Department of Environment, Health, and Natural Resources.

The Threatened and Endangered Species Act of 1973 allows the US Fish and Wildlife Service to impose measures on the Department of Transportation to mitigate the environmental impacts of a road project on endangered plants and animals and critical

wildlife habitats. By locating rare species in the planning stage of road construction, we can avoid or minimize these impacts.

Historic Sites

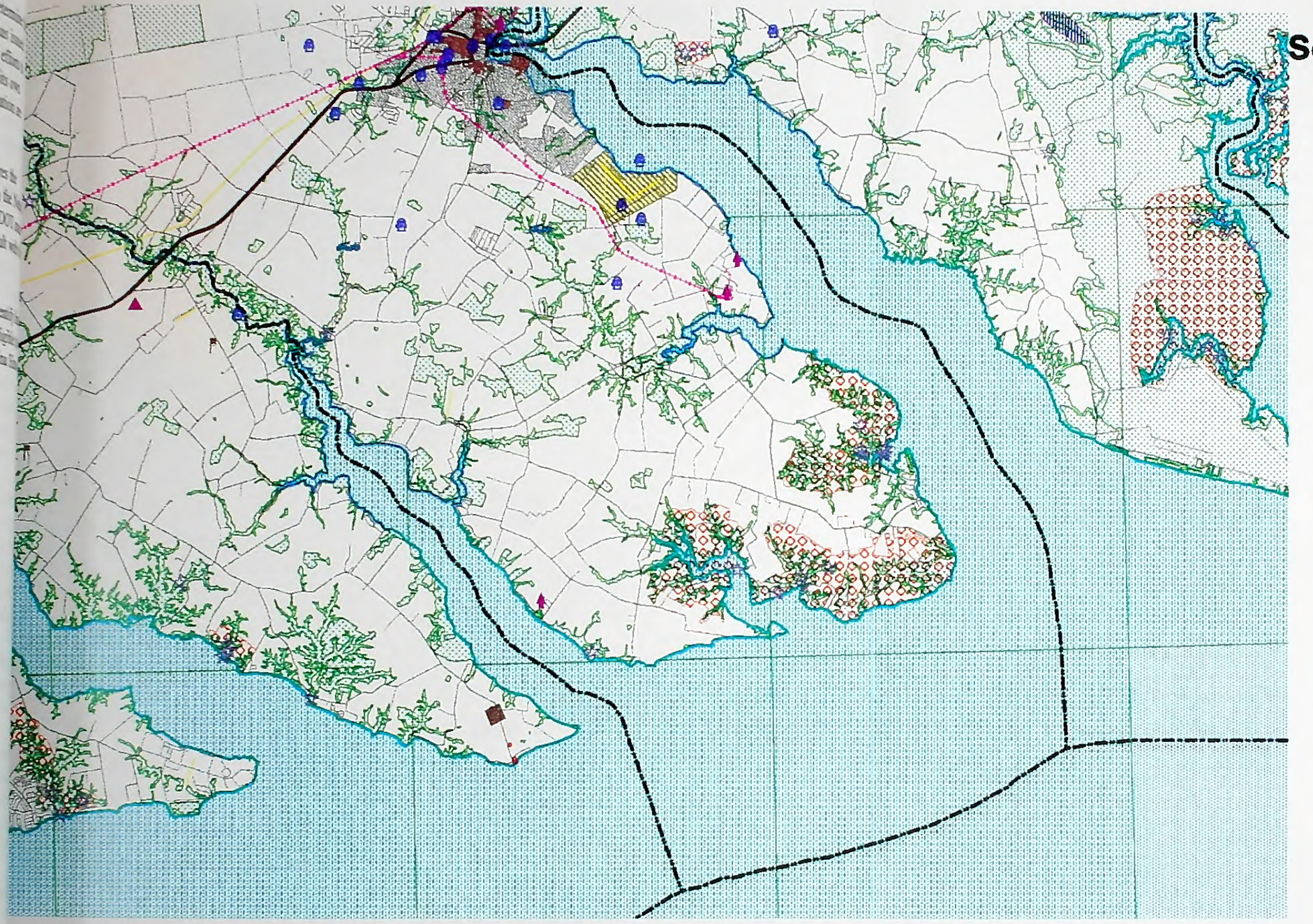
The location of historic sites in Pasquotank County was investigated to determine the possible impact of the various projects studied. The federal government has issued guidelines requiring all State Transportation Departments to make special efforts to preserve historic sites. In addition, the State of North Carolina has issued its own guidelines for the preservation of historic sites. These two pieces of legislation are described below:

National Historic Preservation Act - Section 106 of this act requires the Department of Transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. The DOT must consider the impact of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

NC General Statute 121-12(a) - This statute requires the DOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. DOT must consider impacts and consult with the North Carolina Historical Commission, but is not bound by their recommendations.

FIGURE 6

Environmental Data for Southern Pasquotank County



- NPDES - Non Discharge Systems (100k)
- Surfsce Water Intakes (100k)
- Groundwater Incidents (100k)
- Nat. Haritage Occurence Sites (Restricted-100k)
- Hist. Struct.-NR (Restricted-100k)
- Hist. Dist. -NR (Restricted-100k)
- Solid Waste Facilities (24k)
- Superfund Points (Haz. Substance Disposal Sites - 10(
- Sub.Root Vasculars (point-24k)

Roads (DOT 24k - no attributes)
- Railrosd
- Interstate
- US
- NC
- SR
- City
- Other

- Pipe,Transmission & Airports (100k)
- Prop. Critical Habitat Areas (1 mila buffer-24k)
- Trout Streams (WRC - 100k)
- Trout Streams (DWQ - 100k)
- Anadromous Fish Spawning Areas (100k)
- Fish Nursery Areas (24k)
- NWI (poly-24k)
- Hydro - Major Rivers/Streams (100k)
- Hydro - Major Water Bodies (100k)
- HQW Zones (100k)
- Groundwater Recharge/Discharge Areas (100k)

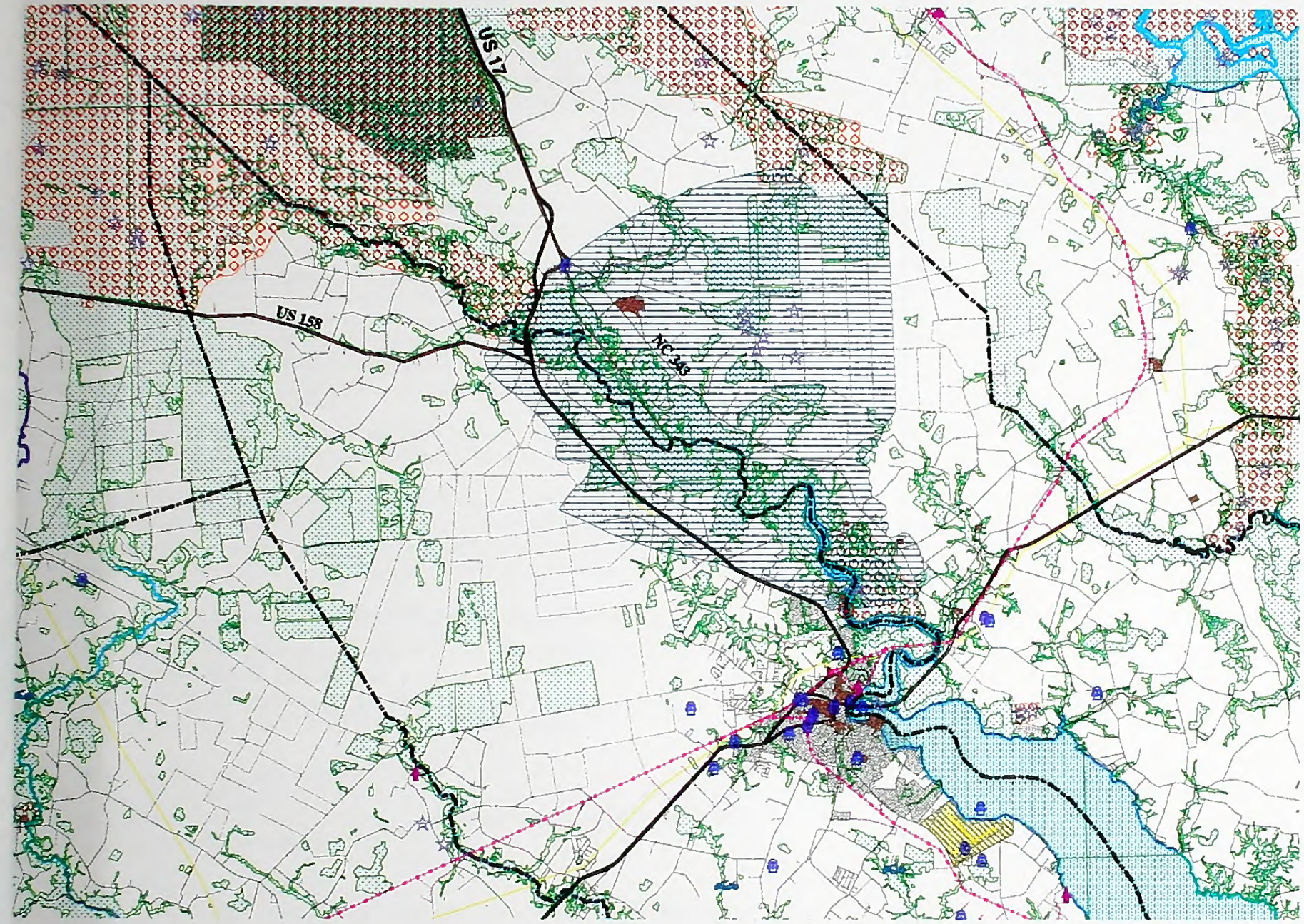
Water Supply Watersheds (24k)
- Critical
- Protected
- Natural Areas (Restricted-24k)
- Municipal Boundaries (24k)
- State Parks (100k)
- Federally Owned Lands (100k)
- River Basins - Major (24k)

N
W E
S

7 0 7 14 Miles

FIGURE 6

Environmental Data for Northern Pasquotank County



- NPDES - Non Discharge Systems (100k)
- Surface Water Intakes (100k)
- Groundwater Incidents (100k)
- Nat. Heritage Occurence Sites (Restricted-100k)
- Hist. Struct.-NR (Restricted-100k)
- Hist. Dist. -NR (Restricted-100k)
- Solid Waste Facilities (24k)
- Superfund Points (Haz. Substance Disposal Sites - 100k)
- Sub.Root Vasculars (point-24k)

Roads (DOT 24k - no attributes)
- Railroad
- Interstate
- US
- NC
- SR
- City
- Other
- Pipe,Transmission & Airports (100k)
- Prop. Critical Habitat Areas (1 mile buffer-24k)
- Trout Streams (WRC - 100k)
- Trout Streams (DWQ - 100k)
- Anadromous Fish Spawning Areas (100k)
- Fish Nursery Areas (24k)
- NWI (poly-24k)
- Hydro - Major Rivers/Streams (100k)
- Hydro - Major Water Bodies (100k)
- HQW Zones (100k)
- Groundwater Recharge/Discharge Areas (100k)

Water Supply Watersheds (24k)
- Critical
- Protected
- Natural Areas (Restricted-24k)
- Municipal Boundaries (24k)
- State Parks (100k)
- Federally Owned Lands (100k)
- River Basins - Major (24k)

N
W E
S

8 0 8 16 Miles

Appendix A
Thoroughfare Plan Street Tabulation and Recommendations

This appendix includes a detailed tabulation of all roads identified as elements of the Pasquotank County Thoroughfare Plan. Table A-1 includes a description of each road section, as well as the length, cross-section, and right-of-way for each section. Also included are existing and projected average annual traffic volumes, roadway capacity, and the recommended ultimate lane configuration.

Typical Cross Sections

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in design of thoroughfares are not practical. Each section of road must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way. Typical cross sections recommended by the Statewide Planning Branch are shown in Figure A-1. These cross sections are typical for facilities at new locations and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross-sections should be developed that meet the needs of the project.

The recommended typical cross sections shown in Table A-1 were derived on the basis of projected traffic, existing capacities, desirable levels of service, and available right-of-way.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections. Ultimate desirable cross sections for each of the thoroughfares are listed here. Recommendations for "ultimate" cross sections are provided for the following:

1. thoroughfares which may require widening after the current planning period;
2. thoroughfares which are borderline adequate, where accelerated traffic growth could render them deficient; and
3. thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

A - Four Lanes Divided with Median, Freeway
This cross section is typical for four-lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 14 m (46 feet), but a wider median is desirable.

B - Seven Lanes, Curb & Gutter
This cross section is not recommended for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as widening from a five lane section when right-of-way is

limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

C - Five Lanes, Curb & Gutter

Typical for major thoroughfares, this cross section is desirable where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

D - Six Lanes Divided with Raised Median, Curb & Gutter

E - Four Lanes Divided with Raised Median, Curb & Gutter

These cross sections are typically used on major thoroughfares where left turns and intersection streets are not as frequent. Left turns would be restricted to a few selected intersections. The 4.8 m (16 ft) median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

F - Four Lanes Divided, Boulevard, Grass Median

Recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 7.3 m (24 ft) is recommended with 9.1 m (30 ft) being desirable.

G - Four Lanes, Curb & Gutter

This cross section is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

H - Three Lanes, Curb & Gutter

In urban environments, thoroughfares which are proposed to function as one-way traffic carriers would typically require this cross section.

I - Two Lanes, Curb & Gutter with Parking on Both Sides

J - Two Lanes, Curb & Gutter with Parking on One Side

Cross sections "I" and "J" are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "I" would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

K - Two Lanes, Paved Shoulder

This cross section is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 30 m (100 ft)

should be required. In some instances, local ordinances may not allow the full 30 m. In those cases, 21 m (70 ft) should be preserved with the understanding that the full 30 m will be reserved by use of building setbacks and future street line ordinances.

L - Six Divided with Grass Median, Freeway

Cross section "L" is typical for controlled access freeways. The 14 m (46 ft) grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 70 m (228 ft) depending upon cut and fill requirements.

M - Eight Lanes Divided with Raised Median, Curb & Gutter

Also used for controlled access freeways, this cross section may be recommended for freeways going through major urban areas or for routes projected to carry very high volumes of traffic.

N - Five Lanes, Curb & Gutter, Widened Curb Lanes

O - Two Lanes, Shoulder Section

P - Four Lanes Divided with Raised Median, Curb & Gutter, Widened Curb Lanes

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities.

Other General Information

The urban curb & gutter cross sections illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If the sidewalk is moved farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The rights-of-way shown for the typical cross sections are the minimum required to contain the street, sidewalks, utilities, and drainage facilities. Additional cut and fill may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

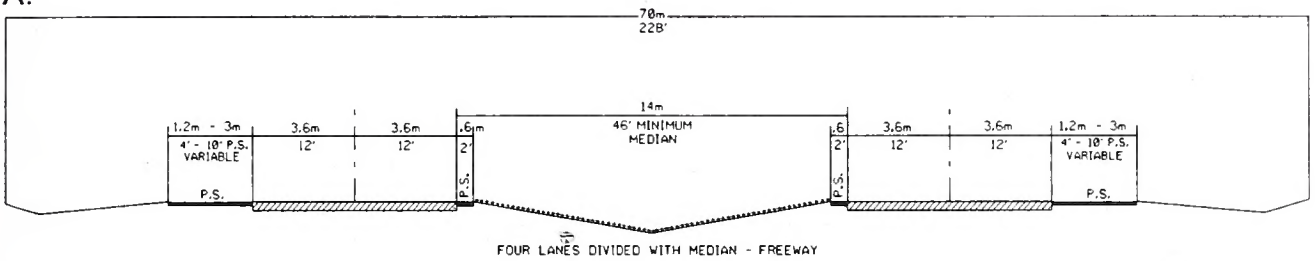
Table A-1

PASQUOTANK STREET INVENTORY AND RECOMMENDATIONS	DISTANCE (MI)	(km)	EXISTING ROADWAY FT(m)/LANES	ROW (FT)	(m)	CAPACITY (VPD)	Average Daily Traffic 1995 (VPD)	2025 (VPD)	PROPOSED ROADWAY (Code/LANES)	ROW (FT)	(m)	CAPACITY (VPD)
US 17												
Elizabeth City PAB to 0.02 miles south of US 158	2.50	4.00	46 (14) / 4LD	140	43	35,000	12,400	28,000	ADQ	ADQ	ADQ	ADQ
0.02 S. of NC 158 - NC 158	0.02	0.03	46 (14) / 4LD	60	18	35,000	11,300	27,500	ADQ	ADQ	ADQ	ADQ
NC 158 - Camden County Line	0.50	0.80	48 (14.6) / 4LD	360	110	35,000	9,000	24,900	ADQ	ADQ	ADQ	ADQ
US 158												
Gates County Line - SR 1001	5.20	8.32	22 (6.7) / 2L	100	30	9,500	3,500	5,500	* / 4LD	ADQ	ADQ	35,000
SR 1001 - US 17	2.40	3.84	22 (6.7) / 2L	100	30	9,500	5,700	17,000	* / 4LD	ADQ	ADQ	35,000
US 17 - Elizabeth City PAB	2.50	4.00	46 (14) / 4LD	140	43	35,000	12,400	28,000	ADQ	ADQ	ADQ	ADQ
NC 34												
Pasquotank River - Weeksville	7.80	12.48	18 (5.5) / 2L	60	18	8,500	500	1,000	ADQ	ADQ	ADQ	ADQ
Weeksville - SR 1132	4.20	6.72	18 (5.5) / 2L	60	18	8,500	2,300	2,900	ADQ	ADQ	ADQ	ADQ
SR 1001												
Perquimans County Line - US 158	4.20	6.72	20 (6.0) / 2L	0	0	9,000	600	1,100	ADQ	ADQ	ADQ	ADQ
SR 1416												
US 17 - Elizabeth City PAB	2.00	3.20	20 (6.0) / 2L	60	18	9,000	1,100	2,000	ADQ	ADQ	ADQ	ADQ
SR1103												
NC 34- SR 1118	3.20	5.12	16 (4.9) / 2L	60	18	7,500	110	400	ADQ	ADQ	ADQ	ADQ
SR 1118												
SR 1100 - SR 1103	5.70	9.12	20 (6.0) / 2L	0	0	9,000	800	1,500	ADQ	ADQ	ADQ	ADQ
SR 1100												
SR 1140 - NC 34	3.90	6.24	18 (5.5) / 2L	0	0	8,500	1,500	3,200	ADQ	ADQ	ADQ	ADQ
SR 1140												

* See typical Cross Section
ADQ = Adequate
L = Lane
LD = Lane Divided

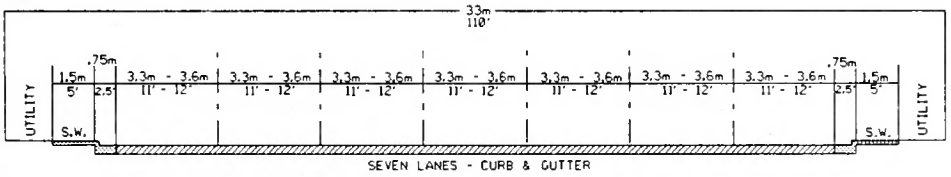
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



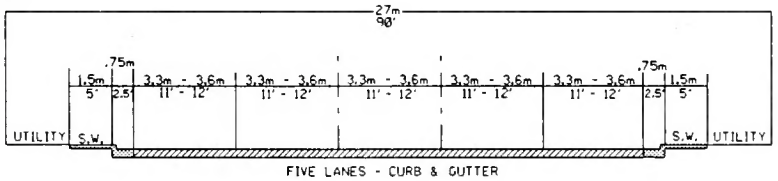
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



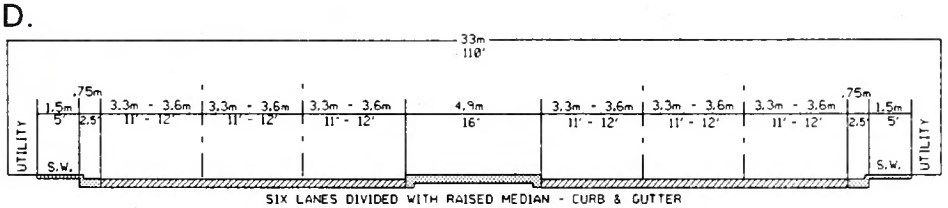
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

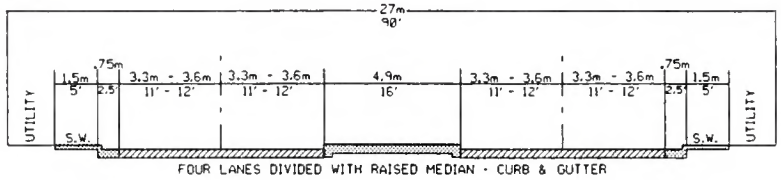


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE A–1

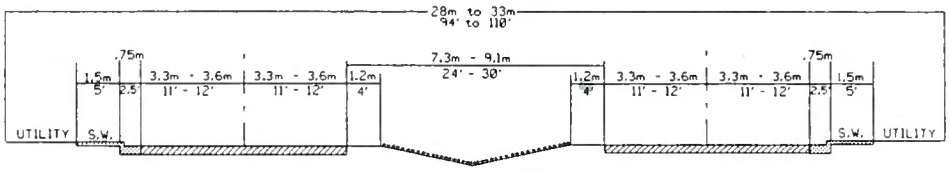
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



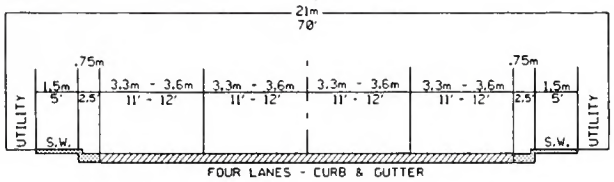
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



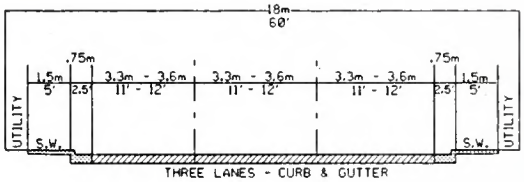
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



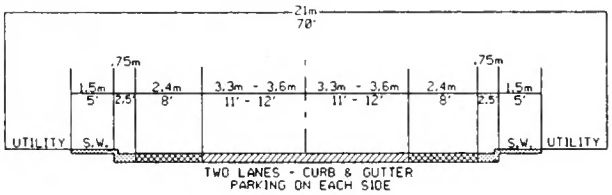
FOUR LANES - CURB & GUTTER

H.



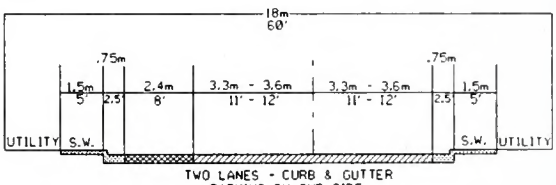
THREE LANES - CURB & GUTTER

I.



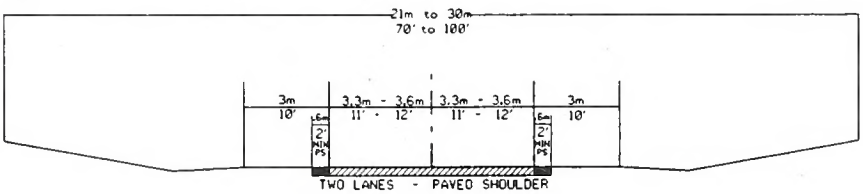
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

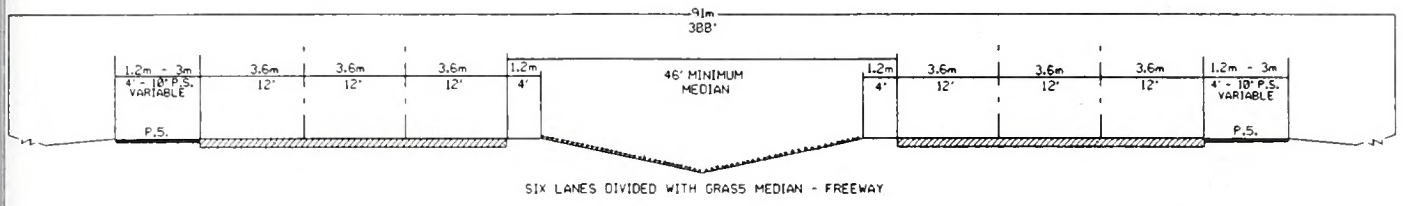
K.



TWO LANES - PAVED SHOULDER

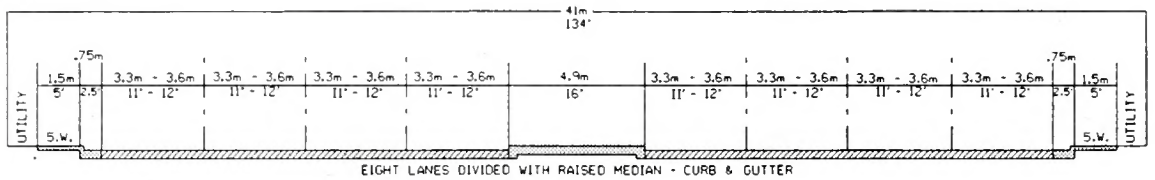
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

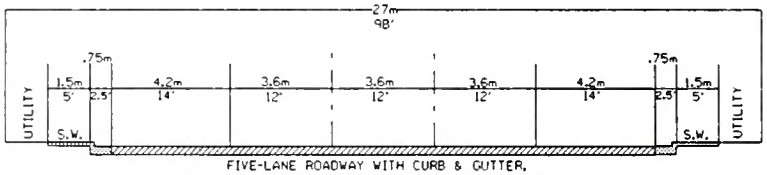
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

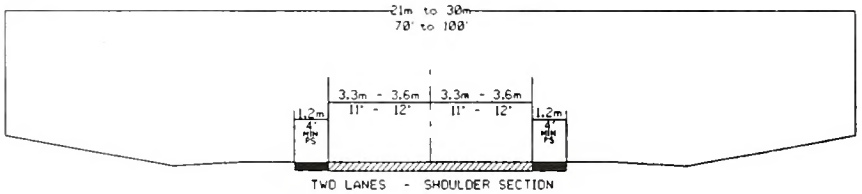
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



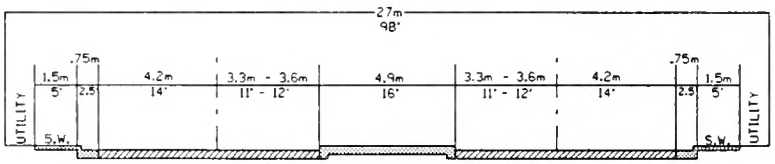
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

FIGURE A-1

Appendix B
Thoroughfare Planning Principles

There are many advantages to thoroughfare planning, but the primary mission is to assure that the road system will be progressively developed to serve future travel desires. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with roadway improvements.

County Thoroughfare Planning Concepts

The underlying notion of the thoroughfare plan is to provide a functional system of streets, roads, and highways that permit direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In the county plan, elements are either urban or rural. In the urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those areas where no urban thoroughfare plan exists, elements are rural and are under the planning jurisdiction of the county.

Within the urban and rural systems, plan elements are classified according to the specific function they are to perform. A discussion of the elements and functions of the two systems follows.

Rural Thoroughfare Classification System

Streets perform two primary functions, traffic service and land access. When combined, these tow functions are basically incompatible. The conflict is not serious if both traffic demands and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property lead to intolerable traffic flow friction and congestion.

The thoroughfare plan provides a functional system of streets that permit travel from origins to destinations with directness, ease, and safety. Different streets in this system are

designed to perform specific functions, thus minimizing the traffic and land service conflict.

In county thoroughfare planning, there are four major systems: principal arterials, minor arterials, major and minor collectors, and local roads.

Principal Arterial System
This system is a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. This is shown by both the trip lengths and the travel densities. The principal arterial system serves all urban areas of over 50,00 population and most of those with a population greater than 5,000. The Interstate system constitutes a significant portion of the principal arterial system.

Minor Arterial System
This system forms a network that links cities, larger towns, and other major traffic generators such as large resorts. The minor arterial system generally serves intrastate and intercounty travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

Collector Road System
The rural collector routes generally serve intracounty travel. These routes serve travel with distances that are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

> **Major Collector Roads:** These routes provide service to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, significant mining and agricultural areas, etc. Major collector roads also link these places to routes of higher classification and serve the more important intracounty travel corridors.
> **Minor Collector Roads:** These collect traffic from local roads and bring all developed areas within a reasonable distance of a major collector road. They also provide service to the remaining smaller communities and link the locally important traffic generators with the rural outskirts.

Local Road System
The local roads are all roads that are not on a higher system. Local residential subdivision streets and residential collector streets are elements of the local road system. Local residential streets include cul-de-sacs, loop streets less than 2,500 feet (760 m) in length, or streets less than one mile (1.6 km) in length. They do not connect thoroughfares or serve major traffic generators and typically do not collect traffic from more than one hundred dwelling units. Residential collectors serve as the connecting street system between local residential streets and the thoroughfare system.

Figure B-1 provides a schematic illustration of a functionally classified rural highway system. The functional classification of roads in Pasquotank County is shown in Figure B-2.

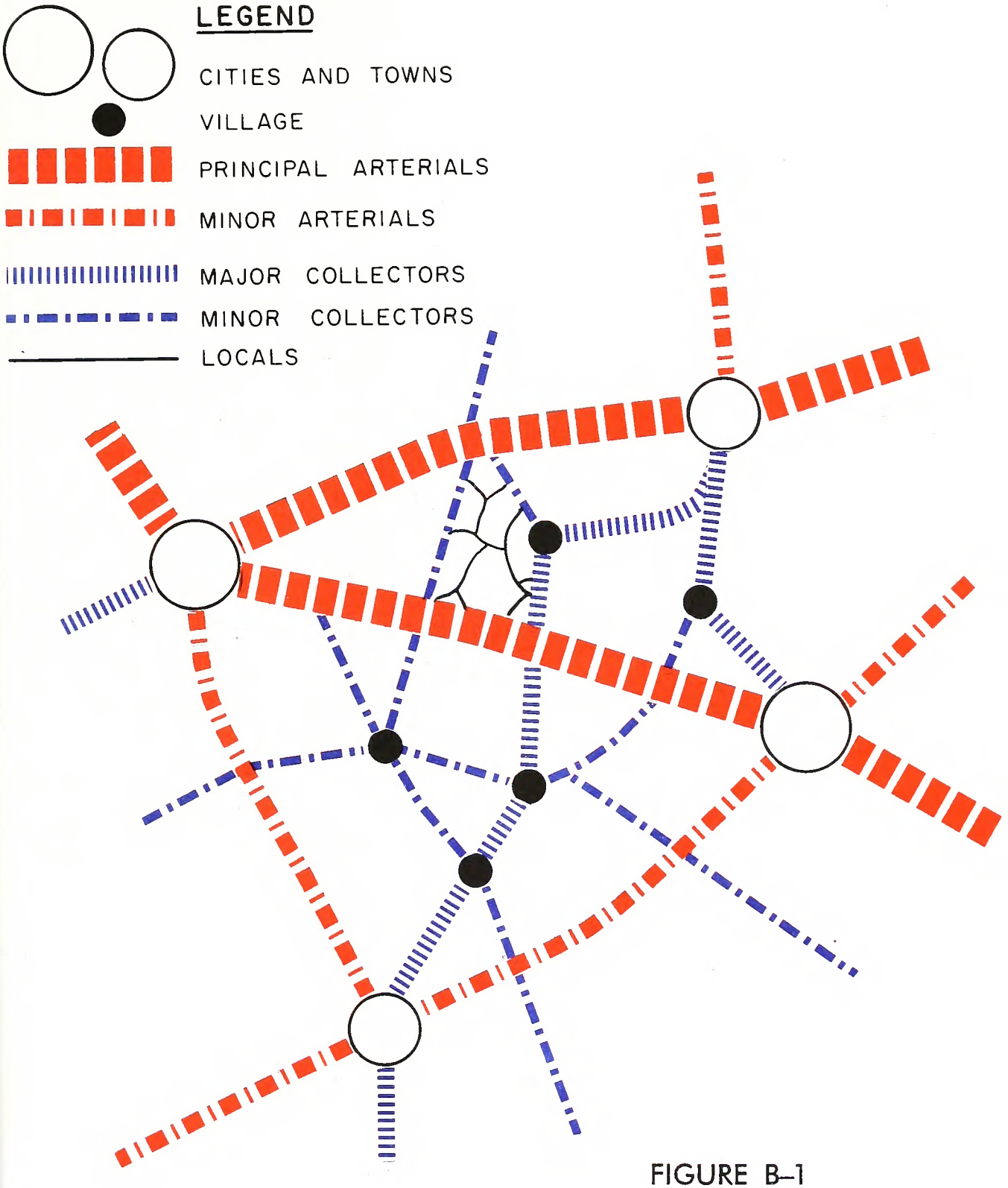
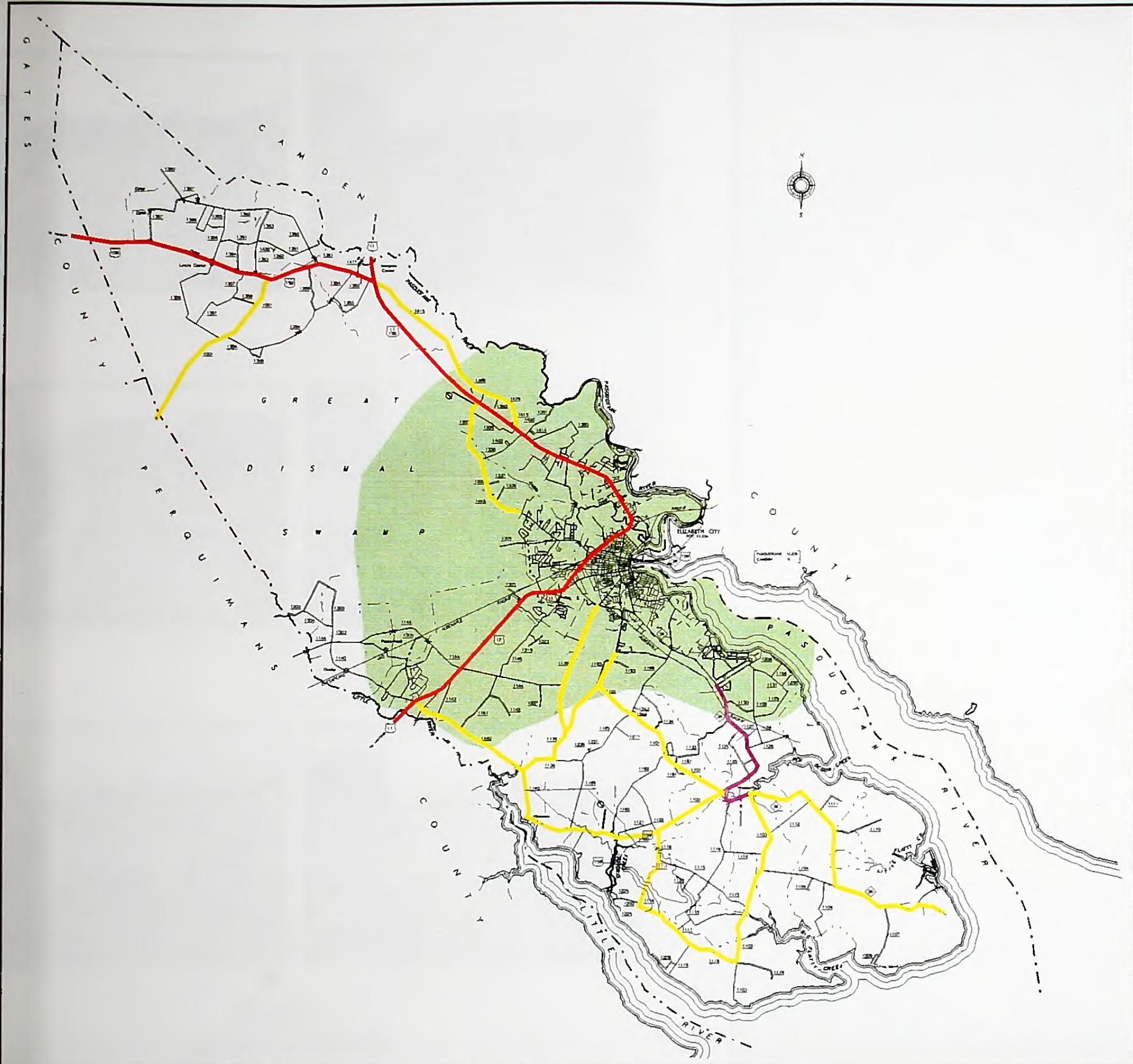


FIGURE B–1

SCHEMATIC ILLUSTRATION
OF FUNCTIONALLY CLASSIFIED
RURAL HIGHWAY NETWORK



LEGEND

- INTERSTATE
- OTHER PRINCIPAL ARTERIALS
- MINOR ARTERIALS
- MAJOR COLLECTORS
- MINOR COLLECTORS
- URBAN AREA PLANNING BOUNDARY FOR ELIZABETH CITY (WITHIN PASQUOTANK COUNTY)

FIGURE B2

FUNCTIONAL CLASSIFICATION

PASQUOTANK COUNTY
NORTH CAROLINA

PREPARED BY THE

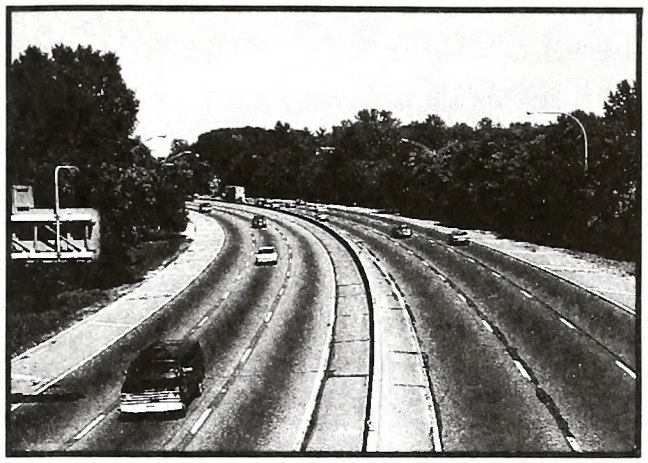
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT

IN COOPERATION WITH THE

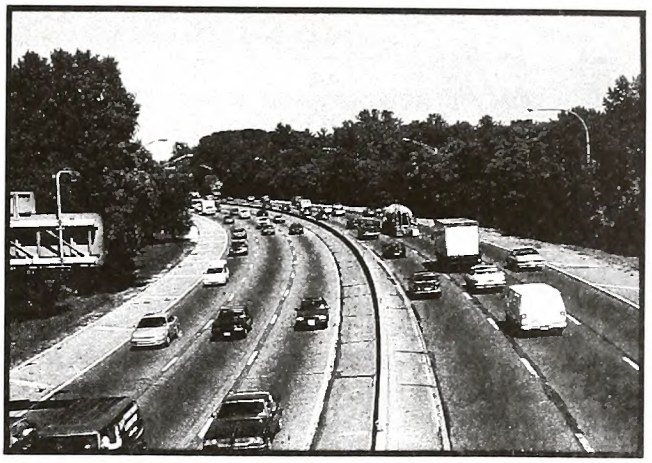
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE
0 2 4 6 8
kilometers
0 1 2 3 5
miles

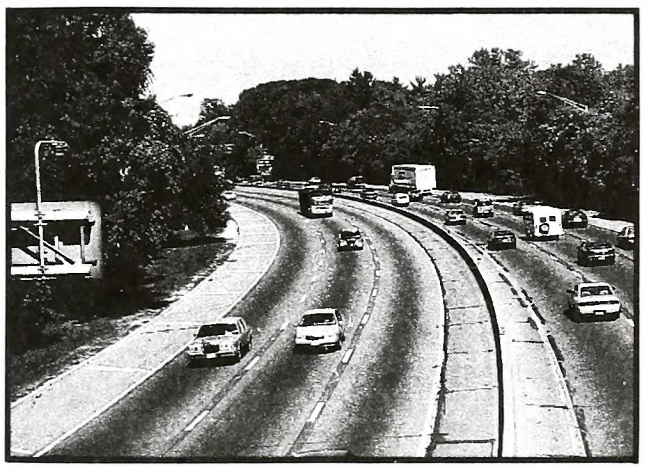
Source: 1994 Highway Capacity Manual



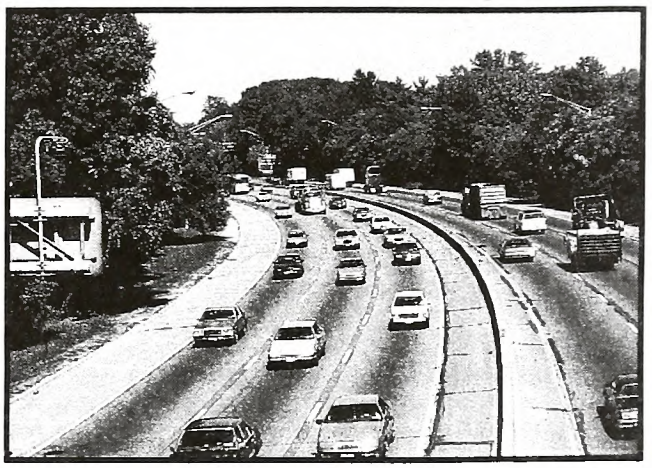
LOS A.



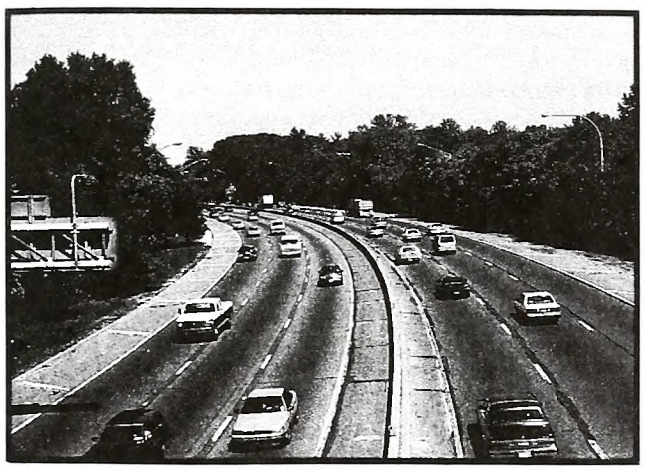
LOS D.



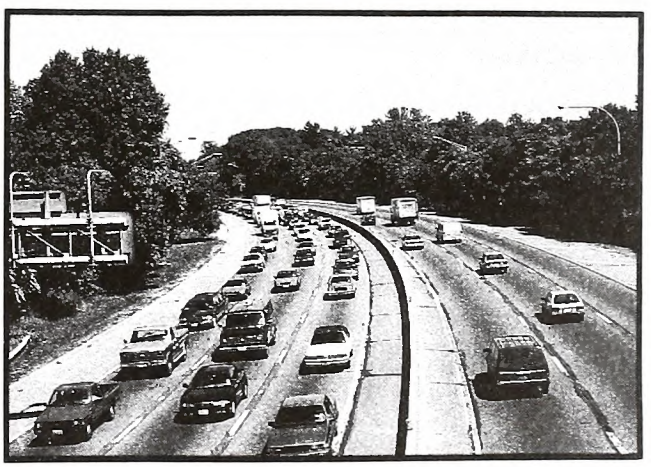
LOS B.



LOS E.



LOS C.



LOS F.

FIGURE E-1

LEVELS OF SERVICE

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet the existing and future travel desires within the area. The primary aim of a thoroughfare plan is to guide the development of the road system in a manner consistent with changing traffic demands. Through proper planning for road development, costly errors and needless expense can be averted. A thoroughfare plan will enable road improvements to be made as traffic demand increases, and help eliminate unnecessary improvements. By developing the street system to keep pace with increasing traffic demands, maximum utilization of the system can be attained that will require a minimum amount of land for roads.

In addition to providing for traffic needs, the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial, and industrial enterprises affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- providing for the development of an adequate major street system as land development occurs;
- reducing travel and transportation costs;
- reducing the cost of major street improvements to the public through the coordination of street systems with private actions;
- enabling private interests to plan their actions, improvements, and development with full knowledge of public intent;
- minimizing disruption and displacement of people and businesses through long range planning for major street improvements;
- reducing environmental impacts such as air pollution, resulting from transportation; and
- increasing travel safety.

These objectives are achieved through improving both the operational efficiency of thoroughfares, and improving the system efficiency by system coordination and layout.

Operational Efficiency

A street's operational efficiency is improved by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is the maximum number of vehicles that can pass a given point on a roadway during a given period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather.
Physical ways to improve vehicular capacity include:

- *Street widening* - Widening a street from two to four travel lanes, can more than double the capacity of the roadway because additional maneuverability for the traffic is provided.
- *Intersection improvements* - Increasing the turning radii, adding exclusive turn lanes, and channeling conflicting traffic movements can improve the capacity of an existing intersection.
- *Improvements to vertical and horizontal alignment* - These improvements can reduce the congestion caused by slow moving vehicles.
- *Elimination of roadside obstacles* - This can reduce side friction and improve a driver's field of sight.

Operational ways to improve street capacity include:

- *Control of access* - A roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with identical lane width and number.
- *Parking relocation* - Relocating on-street parking to an off-street site increases capacity by providing additional street width for traffic flow and reducing the friction to traffic flow caused by parking and unparking vehicles
- *One-way operation* - The capacity of a street can sometimes be increased 20-50%, depending upon turning movements and street width, by initiating one-way traffic operations. One-way streets also can improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.
- *Reversible lanes* - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods or special events.
- *Signal phasing and coordination* - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

- *Carpools* - Encouraging people to form carpools and van pools for journeys to work and other trip purposes reduces the number of vehicles on the roadway and raises the people-carrying capability of the street system
- *Alternate modes* - Encouraging the use of alternate modes of travel such as transit, bicycles, or walking for short trips can reduce demand on the roadways.
- *Work hours* - Encourage industries, business, and institutions to stagger work hours or establish variable work for employees. This will reduce travel demand in peak periods and spread peak travel over a longer period.
- *Land use* - Plan and encourage land use development or redevelopment in a more travel efficient manner.

System Efficiency

Another means of altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, thoroughfare planning is done for established areas and is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect major road locations.

Through the thoroughfare planning process, it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are listed below:

1. The plan should be derived from a thorough knowledge of today's travel - its component parts, and the factors that contribute to it, limit it, and modify it.
2. Traffic demands must be sufficient to warrant the designation and development of each major road. The thoroughfare plan should be designed to accommodate a large portion of major traffic movements on a few roads.
3. The plan should conform to and provide for the land development plan for the area.
4. Certain considerations must be given to development beyond the current planning period. Particularly in outlying or sparsely developed areas that have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights-of-way for future thoroughfare development.
5. While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

Appendix C
Benefits Analysis

Reduced road user costs should result from any roadway improvement, from a simple widening to the construction of a new roadway to relieve congested or unsafe conditions. Comparisons of the existing and the proposed facilities have been made in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings over the design period using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume/capacity ratio.

The impact of a project on economic development potential is shown as the probability that it will stimulate the economic development of an area by providing access to developable land and reducing transportation costs. It is a subjective estimate based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability is rated on a scale from 0 (representing no development potential) to 1.00 (representing excellent development potential).

The environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment. Below is a list of the items that are considered when evaluating the impacts on the environment.

Table C-1

Environmental Considerations		
Physical Environment	**Social and Cultural Environment**	**Economic Environment**
Air quality	Housing	Businesses
Water Resources	Neighborhoods	Employment
Soils and Geology	Noise	Economic Development
Wildlife	Educational Facilities	Public Utilities
Vegetation	Churches	Transportation Costs
	Parks/Recreational Facilities	Capital Costs
	Public Health and Safety	Operation/Maintenance Costs
	National Defense	
	Aesthetics	

The environmental impact analysis also uses a probability rating from 0 to 1.00. A negative value is assigned to the probability to indicate a negative impact. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impacts of a project. Table C-2 shows the probability scale used in the analysis. This table can be used as a guideline for interpreting the "Economic Development" and "Environmental Impact" values given in Table C-1.

Table C-2

Impact	Probability
High	1.00
Significant	0.75
Moderate	0.50
Slight	0.25
None	0.00

Offsetting the benefits that would be derived from any project is the cost of its construction. A new facility, despite its high projected benefits, might prove to be unjustified due to the excessive costs involved in construction. Since there are no projects recommended, there is no Benefit-Cost analysis done in this report.

Appendix D

Recommended Definitions and Design Standards for Subdivision Ordinances

Definitions

Streets and Roads

Rural Roads

1. *Principal Arterial* - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. *Minor Arterial* - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. *Major Collector* - A road which serves major intra-county travel corridors and traffic generators and provides access to the Major Collector system.

4. *Minor Collector* - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. *Local Road* - A road which serves primarily to provide access to adjacent land, over relatively short distances.

Urban Streets

1. *Major Thoroughfares* - Major thoroughfares consist of Inter-state, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. *Minor Thoroughfares* - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. *Local Street* - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

Specific Type Rural or Urban Streets

1. *Freeway, expressway, or parkway* - Divided multi-lane roadways designed to carry large volumes of traffic at high speeds. A *freeway* provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An *expressway* is a facility with full or partial control of access and generally with grade separations at major intersections. A *parkway* is for non-commercial traffic, with full or partial control of access.

2. *Residential Collector Street* - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. *Local Residential Street* - Cul-de-sacs, loop streets less than 750 meters in length, or streets less than 1.5 kilometers in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. *Cul-de-sac* - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn around provided.

5. *Frontage Road* - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. *Alley* - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

Property

Building Setback Line

A line parallel to the street in front of which no structure shall be erected.

Easement

A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

Lot

A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. (Also includes "plat" and "parcel").

Subdivision

Subdivider

Any person, firm, corporation, or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

Subdivision

All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets. The following shall not be included within this definition nor subject to these regulations:

- The combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein
- the division of land into parcels greater than four hectares where no street right-of-way dedication is involved

- the public acquisition, by purchase, of strips of land for the widening or the opening of streets
- the division of a tract in single ownership whose entire area is no greater than 0.8 hectares into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

Dedication
A gift, by the owner, of his property to another party without any compensation being given for the transfer. The dedication is made by written instrument and completed with an acceptance.

Reservation
Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Design Standards

Streets and Roads
The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted. The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally, the proposed streets should be the extension of existing streets if possible.

Right-of-Way Widths
Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

The subdivider will only be required to dedicate a maximum of 30 meters of ROW. In cases where over 30 meters of ROW is desired, the subdivider will be required only to reserve the amount in excess of 30 meters. In all cases in which ROW is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principal and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width ROW, not less than eighteen meters in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities

as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required ROW shall be dedicated.

Table D-1

Minimum Right-of-Way Requirements		
Area Classification	**Functional Classification**	**Minimum ROW**
RURAL	Principal Arterial	Freeways: 105 m Other: 60 m
	Minor Arterial	30 m
	Major Collector	30 m
	Minor Collector	24 m
	Local Road	18[1] m
URBAN	Major Thoroughfare	27 m
	Minor Thoroughfare	21 m
	Local Street	18[1] m
	Cul-de-Sac	variable[2]

[1] The desirable minimum right-of-way (ROW) is 18 m. If curb and gutter is provided, 15 m is adequate on local residential streets.

[2] The ROW dimension will depend on the radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

Street Widths

Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. *Local Residential*
   - Curb & Gutter section: 7.8 meters, face to face of curb
   - Shoulder section: 6.0 meters to edge of pavement, 1.2 meters for shoulders

2. *Residential Collector*
   - Curb & Gutter section: 10.2 meters, face to face of curb
   - Shoulder section: 6.0 meters to edge of pavement, 1.8 meters for shoulders

Geometric Characteristics

The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under *Right-of-Way* shall apply.

1. *Design Speed* - The design speed for a roadway should be a minimum of 10 km/h (5 mph) greater than the posted speed limit. The design speeds for subdivision type streets are shown in Table D-2.
2. *Minimum Sight Distance* - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provide and calculated using the parameters set forth in Table D-3.

3. *Superelevation* - Table D-4 shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

4. *Maximum and Minimum Grades*
   - the maximum grades in percent are shown in Table D-5
   - minimum grade should not be less then 0.5%
   - grades for 30 meters each way from intersections (measured from edge of pavement) should not exceed 5%

Table D-2

Design Speeds (in km/h)			
Facility Type	**Desirable**	**Minimum**	
		Level	**Rolling**
RURAL			
Minor Collector Roads	100	80	60
Local Roads [1]	80	80	60
URBAN			
Major Thoroughfares [2]	100	60	60
Minor Thoroughfares	100	50	50
Local Streets	50	50	30

[1] Local Roads include Residential Collectors and Local Residential
[2] Major Thoroughfares other than Freeways or Expressways

Intersections

1. Streets shall be laid out so as to interest as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters between survey centerlines.

Cul-de-sacs

Cul-de-sacs shall not be more than one hundred and fifty (150) meters in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line

should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

Table D-3

Sight Distance					
Design Speed (km/h)	**Stopping Sight Distance (m)**		**Minimum K[1] Values (m)**		**Passing Sight Distance (m) for 2-lanes**
	Desirable	Minimum	Crest Curve	Sag Curve	
30	30	29.6	3	4	*
50	70	57.4	9	11	*
60	90	74.3	14	15	*
90	170	131.2	43	30	*
100	210	157.0	62	37	*

Note: General practice calls for vertical curves to be multiples of 10 meters. Calculated lengths shall be rounded up in each case.

[1] K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990."

* Minimum passing distance for 2-lanes is currently under revision. (Reference NCDOT Roadway Metric Design Manual page 1-12 T-1)

Table D-4

Superelevation Table			
Design Speed (km/h)	**Minimum Radius of Maximum e[1]**		
	e = 0.04	**e = 0.06**	**e = 0.08**
50	100	90	80
65	175	160	145
80	280	250	230
100	490	435	395

[1] e = Rate of roadway superelevation, meter per meter

Note: Reference NCDOT Roadway Design Manual, page 1-12 T-6 through T-8

Table D-5

Maximum Vertical Grade				
Facility Type	**Design Speed (km/h)**	**Minimum Grade in Percent**		
		Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads *	30	7	10	12
	50	7	9	10
	65	7	8	10
	80	6	7	9
	100	5	6	8
	110	4	5	6
Local Roads * [1]	30	--	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	--
URBAN				
Major Thoroughfares [2]	50	8	9	11
	65	7	8	10
	80	6	7	9
	100	5	6	8
Minor Thoroughfares *	30	9	12	14
	50	9	11	12
	65	9	10	12
	80	7	8	10
	100	6	7	9
	110	5	6	7
Local Streets *	30	--	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	--

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table. (Reference NCDOT Roadway Metric Design Manual, page 1-12 T-3)

[1] Local Roads including Residential Collectors and Local Residential.

[2] Major Thoroughfares other than Freeways or Expressways.

Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are mode for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 6.0 meters.

3. Dead-end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead-end as may be required by the Planning Board.

Permits for Connection to State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9.0 meters from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters from the face of curb.

Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2-lane, two-way traffic should be as follows:

- shoulder section approach:
    - under 800 ADT design year - minimum 8.4 meters width, face to face of parapets or rails, or pavement width plus 3 meters, whichever is greater.
    - 800 - 2000 ADT design year - minimum 10.2 meters width, face to face of parapets or rails, or pavement width plus 3.6 meters, whichever is greater.
    - over 2000 ADT design year - minimum width of 12 meters, desirable width of 13.2 meters width face to face of parapets or rails

- curb and gutter approach:
    - under 800 ADT design year - minimum 7.2 meters face to face of curbs.
    - over 800 ADT design year - with of approach pavement measured face to face of curbs.

- Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

- shoulder section approach - width of approach pavement plus width of usable shoulders on the approach left and right (shoulder width 2.4 m minimum, 3 m desirable).
- curb and gutter approach - width of approach pavement measured face to face of curbs.

Table D-6

Exact Metric Equivalents	
English Units	**Metric Units**
1 inch	equals 2.54 centimeters (cm)
1 foot	equals 0.30 meters (m)
1 mile	equals 1.61 kilometers (km)
1 acre	equals 0.40 hectares (ha)

Table D-7

Exact English Equivalents	
Metric Units	**English Units**
1 centimeter (cm)	equals 0.39 inches
1 meter (m)	equals 3.28 feet
1 kilometer (km)	equals 0.62 miles
1 hectare (ha)	equals 2.47 acres

Table D-8

NCDOT Metric Roadway Conversions			
Lane Widths		**Shoulder Widths**	
8 feet	2.4 m	1 foot	0.3 m
9 feet	2.7 m	2 feet	0.6 m
10 feet	3.0 m	4 feet	1.2 m
11 feet	3.3 m	6 feet	1.8 m
12 feet	3.6 m	8 feet	2.4 m
14 feet	4.2 m		

Appendix E
Level of Service Definitions

The various levels of service are defined below for uninterrupted flow facilities, but the basic concepts apply to all roads. These levels of service are illustrated in Figure E-1.

LOS A
Represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

LOS B
Is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

LOS C
Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably in this range.

LOS D
Represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

LOS E
Represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

LOS F
Is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go

waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good.

Appendix F
County and Public Involvement

August 12, 1996:

Meeting with county manager, Randy Keaton, and county planner, Rodney Bunch, to discuss initiation of the Pasquotank County Thoroughfare Plan.

November 21, 1996:

Meeting with the Pasquotank County Planning Board to present preliminary information and to receive input from the Board regarding the Pasquotank County Thoroughfare Plan.

April 24, 1997:

Meeting with the Pasquotank County Planning Board to present the Preliminary Thoroughfare Plan Recommendations, and to receive any final input from the Planning Board before it is presented to the Board of Commissioners.

August 13, 1997

Meeting with the Pasquotank County Board of Commissioners to discuss the final Thoroughfare Plan recommendations.

September 16, 1997

Meeting with the Pasquotank County Planner and Manager, the Elizabeth City Planner, and representatives from the NCDOT. At this meeting, NCDOT offered to revise the Elizabeth City Thoroughfare Plan to address the concerns of Pasquotank County, with the coordination of the Elizabeth City Officials. Pasquotank County and Elizabeth City would jointly request revisions to the Elizabeth City Thoroughfare Plan so that the Pasquotank County Thoroughfare Plan would be adopted. Pasquotank County and Elizabeth City then decided not to pursue this option. The Elizabeth City Thoroughfare plan remains unrevised, and the Pasquotank County Thoroughfare Plan remains unadopted.

Appendix G
Elizabeth City Thoroughfare Plan

The Elizabeth City Thoroughfare Plan was mutually adopted by the town of Elizabeth City on July 1, 1996 and by the North Carolina Department of Transportation on September 15, 1996. The report was completed in January, 1997. The Pasquotank County Thoroughfare Plan does not include the Elizabeth City urban study area. Figure G-1 shows the Elizabeth City Thoroughfare Plan. A copy of the Elizabeth City Thoroughfare Plan Report may be requested by writing to:

North Carolina Department of Transportation
Statewide Planning Branch
PO Box 25201
Raleigh, NC 27611

FIGURE G–1

ELIZABETH CITY THOROUGHFARE PLAN

LEGEND

	EXISTING	PROPOSED
FREEWAY/EXPRESSWAY	▬▬	▮▮▮
MAJOR THOROUGHFARE	▬▬	▮▮▮
MINOR THOROUGHFARE	▬▬	▮▮▮

ADOPTED BY:

CITY OF ELIZABETH CITY: JULY 1, 1996

RECOMMENDED BY STATEWIDE PLANNING BRANCH: AUGUST 19, 1996

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION: SEPTEMBER 5, 1996

ELIZABETH CITY

PASQUOTANK COUNTY
NORTH CAROLINA

Prepared by the
North Carolina Department of Transportation
Division of Highways–Statewide Planning Branch
in cooperation with the
U.S. Department of Transportation
Federal Highway Administration

SCALES

0 0.5 1.0 1.5 3.0
miles

0 1 2 3 5
kilometers

June 17, 1996